Raychart 320 Chartplotter

Owner's Handbook

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SAFETY NOTICES

WARNING: NAVIGATION AID

This device is intended to be used as an aid to navigation. Its accuracy can be affected by many factors, including equipment failure or defects, environmental conditions and incorrect handling or use. It is the user's responsibility to exercise common prudence and navigational judgement. This device should not be relied upon as a substitute for such prudence and judgement.

CAUTION:

Do not connect/disconnect the GPS Antenna from the display unit whilst power is applied. Such action could cause irreparable damage.

WAAS Satellite Differential GPS

In near continuous broadcast since December 1999, WAAS provides differential augmentations to GPS. Designed to enhance the basic GPS service to satisfy the aviation industry's navigation requirement for instrument flight rule navigation and landing, IFR and approach landings, WAAS is also available for other GPS applications such as marine navigation, surveying, agriculture and automotive applications.

WAAS consists of a network of ground reference stations across the United States that monitor GPS satellite data. The master stations collect data from the reference stations and create a GPS correction message, taking into account selective availability (SA), GPS satellite orbit and clock drift, and signal delays caused by the atmosphere and ionosphere. The 'corrected' differential messages are then broadcast through two Geostationary Earth Orbit (GEO) satellites on the same frequency as the GPS signal. The Raymarine Raychart 320 GPS receiver utilizes two of its 12 channels to 'listen' and decode the corrected WAAS messages. The result is a DGPS system that provides improved accuracy (<7 meters) in comparison with standard GPS (100 meters) and land based DGPS (10 meters) systems.

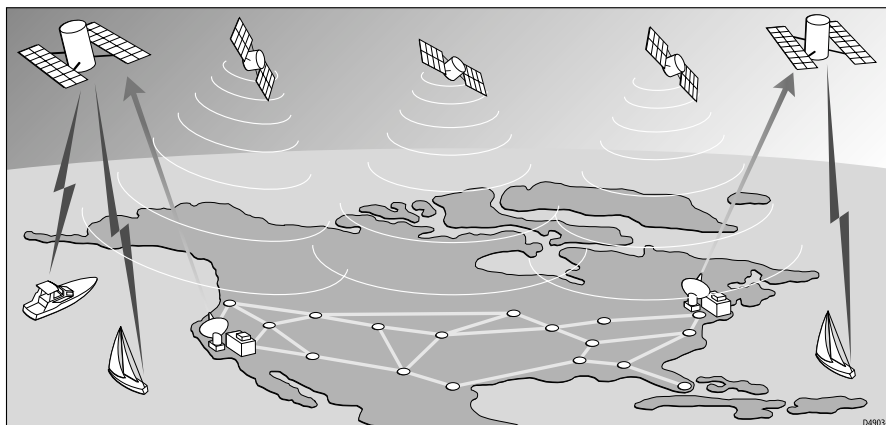The WAAS system is shown diagrammatically in *Figure i*.

Figure i: The WAAS System

Availability of the WAAS System in North America

The WAAS system is presently broadcasting and being tested for aviation use. It is expected to be certified by the FAA in 2002. During this testing and certification period, continuous service is expected; however, brief signal outages may occur as refinements and upgrades are made to the system. The status of WAAS and planned outages are available on-line at the following websites:

http://wwws.raytheontands.com/waas

or http://www.raymarine.com

Your unit is shipped from the factory in normal GPS mode. For improved accuracy provided by the WAAS system, you need to enable the WAAS capability of your unit.

➤   To enable WAAS:
1. Press the **MENU** key
2. Press GPS SETUP soft key
3. Press FIX MODE soft key to select SD mode.

Extended Offshore Coverage

Using two GEO satellites, WAAS provides augmented differential GPS coverage for most of North America. Since the WAAS differential messages are broadcast by GEO satellites, the WAAS signals cover a greater area both inland and offshore in comparison with land based DGPS systems. Coverage for North America is shown in *Figure ii*.
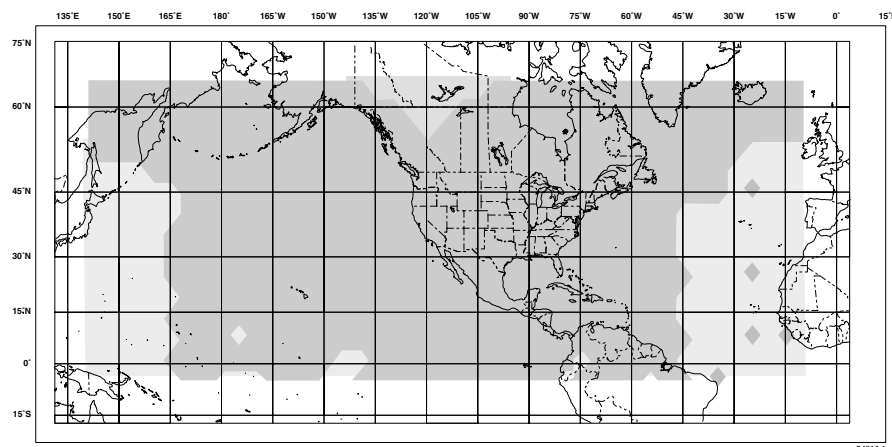
Figure ii: WAAS Coverage Map

Coverage Outside of North America

Europe and Asia are developing similar systems to WAAS called EGNOS and MSAS respectively. Combined with WAAS, these systems will provide global satellite based differential GPS augmentation into the future.

EGNOS is currently in the early testing and qualification phases and signal outages may occur at any time. The status of EGNOS and any planned outages are available on-line at Raymarine's website: http://www.raymarine.com

Your unit is shipped from the factory in normal GPS mode. For improved accuracy provided by the EGNOS system, you need to enable the EGNOS capability of your unit.

➤ To enable EGNOS:
   1. Press the **MENU** key
   2. Press GPS SETUP soft key
   3. Press FIX MODE soft key to select SD mode.

Accuracy and Continuation of Broadcast Coverage

The navigational accuracy of equipment using these satellite broadcast SD signals during the testing and qualification phases is not guaranteed by Raymarine Limited or Raytheon Corporation, nor is the continuation of the broadcast SD signals the responsibility of Raymarine Limited or Raytheon Corporation.

Preface

This handbook covers the Raychart 320 Chartplotter manufactured by Raymarine.

It contains important information on the installation and operation of your new equipment. In order to obtain the best results in operation and performance, please read this handbook thoroughly.

Raymarine's Product Support representatives or your authorized dealer are available to answer any questions you may have.

Warranty

To register your Raychart 320 Chartplotter ownership, please take a few minutes to fill out the warranty registration card found at the end of this handbook. It is important that you complete the owner information and return the card to the factory in order to receive full warranty benefits.

EMC Conformance

All Raymarine equipment and accessories are designed to the best industry standards for use in the leisure marine environment.

The design and manufacture of Raymarine equipment and accessories conform to the appropriate Electromagnetic Compatibility (EMC) standards, but correct installation is required to ensure that performance is not compromised.

Technical Accuracy

To the best of our knowledge, the information in this handbook was correct when it went to press. However, the Raymarine policy of continuous product improvement may change product specifications without notice.

Consequently, unavoidable differences may occur between the product and the handbook from time to time, for which Raymarine cannot accept liability.

Contents - Raychart 320 Chartplotter

Chapter 1: Overview

1.1 Introduction

This handbook describes the Raychart 320 Chartplotter.

Note: *Many illustrations in this handbook show example screens. The screen you see on your display depends on your system configuration and set up options, so it may differ from the illustration.*

How this Handbook is Organized

Chapter 1 - Overview (this chapter) provides an overview of the features and functions of the Raychart 320 Chartplotter. You should read this chapter to familiarize yourself with the Chartplotter.

Chapter 2 - Getting Started provides an overview of the controls. It also explains how to start using the Chartplotter.

Chapters 3 - Operation provides detailed operating information for the main chartplotter functions - plotting waypoints and routes, following routes, using tracks, SmartRoute, Man Overboard and Data Log Mode.

Chapter 4 - Setting Up the Chartplotter provides instructions for setting up your Chartplotter system to suit your preferences. You should read this chapter to determine how to set up your system preferences.

Chapter 5 - Installation provides planning considerations and detailed instructions for installing the Chartplotter.

Chapter 6 - Maintenance & Fault Finding provides information on user maintenance and what to do if you experience problems.

Appendix A lists the technical specifications for the Chartplotter.

Appendix B defines the SeaTalk and NMEA data that is transferred on integrated systems.

Appendix C provides a list of abbreviations used in this handbook.

An **Index** provides an easy lookup to specific keywords or topics.

Installation Templates are included at the end of this handbook.

A summary of the Chartplotter controls and functions are provided on the **Quick Reference Card** supplied with your system.

1.2 Features

General

The Raychart 320 Chartplotter is designed to use the following navigational signals:

- Satellite Differential GPS (eg, WAAS)
- Ground based Differential GPS
- Standard GPS

These are listed in order of accuracy and their availability is dependent upon your location. The Raychart 320 Chartplotter uses the best available signal to provide optimum accuracy.

The Raychart 320 Chartplotter is waterproof to CFR46 and can be installed either above or below deck.

The unit comprises

- Low profile antenna (Raychart 320):
- $4\frac{1}{2}$ in. LCD display comprising:
    - Eight dedicated (labelled) control keys
    - Four (labelled) soft keys
    - Trackpad
    - Two slots for C-MAP NT® chart cards (C-Cards)

The display and keys can be illuminated for night-time use.

Display

- Displays chart information from C-MAP NT® chart cards
- Computes position information from SDGPS, DGPS or GPS
- Displays and transmits SeaTalk and NMEA data
- Cursor echo across SeaTalk
- Choice of orientation: Head Up, Course Up and North Up

Display Modes

The Chartplotter can display data in the following modes, cycled through by means of the **DISPLAY** key:

- Default Chart display
- GPS Data (four pages) / Waypoint Data (three pages)
- Boat Data (three pages) / Environment Data (two pages)
- Bearing & Distance Indicator (BDI) / Course Deviation Indicator (CDI)
- Data Boxes

- Data Log
- Return to default Chart display

Those modes containing more than one page of data provide additional soft keys giving access to the sub-sets of data within each group, each cycled through with the associated soft key.

1.3 The Chartplotter Display

The chartplotter includes a small-scale world map. Detailed navigation information is displayed when a C-MAP NT® chart card is installed. A plotter mode is provided to enable route plotting and tracking at large scales even when a chart card is not installed.

Note: *The default world map scale is 512nm.*

When a position fix has been established, your vessel's position, if on screen, is shown as a boat shape, pointing in the direction of the current heading (or COG if heading data is not available). If no heading or COG data is available, the vessel is shown as a circle.

A status bar at the top of the screen displays the scale, with either cursor position, range and bearing or, when the cursor is homed (locked) to the vessel (by pressing FIND SHIP), vessel position, Speed Over Ground (SOG) and Course Over Ground (COG).

Note: *When the cursor is homed, it is 'locked' to the vessel and moves with it. The screen is automatically panned to keep the vessel and cursor in the center of the screen.*

The current route is shown and any waypoints you have placed are displayed (unless you set them to off in Set Up). Information can be viewed on-screen by positioning the cursor over a waypoint, current route, track or chart object.

Functions are available to control the display as follows:

- Zoom in/out
- Pan the Display
- Centre the Chart on the Vessel

Chartplotter

Display Functions

TheRaychart 320 Chartplotter includes the following functions:

- Display C-MAP NT C-Card chart information including Ports and Tides (if available)
- View chart information (if available) for the Nearest Port

- Place, Move, Erase and Edit a Waypoint
- Goto Waypoint or Cursor
- Create, Save, Name, Edit and Follow a Route
- Review Route and Waypoint Lists
- Display vessel's track; Save and Name the Track for re-call to screen
- Use *SmartRoute* to make the current track into a route
- Set Up Alarms and Timers
- Man OverBoard (MOB) to navigate back to a missing person or object
- Data Log display

The chartplotter includes a world map that can be used for route planning. Detailed navigation information is displayed when a C-MAP NT C-Card is installed.

Chart Operations Using GPS Navigation Data Pages

Amongst a number of information pages, the GPS Data pages provide a series of four textual displays, selected by the associated soft key. These provide essential information associated with plotting a course for your vessel.

- Fix status
- Steering Indication
- Position Latitude/Longitude
- Waypoint Bearing and Range
- Course Over Ground (COG)
- Speed Over Ground (SOG)
- Current Time
- Sunrise and Sunset Times
- Twilight Times

The range of pages is detailed in *Selecting the Display Mode* in *Chapter 2*. The complete range of pages is described fully in *Chapter 3 Operation*.

1.4 Operating Controls

Operation utilizes a number of buttons and on-screen controls. These include:

- A trackpad providing up, down, left, right and diagonal control of an on-screen cursor.
- Eight dedicated (labelled) control keys.
- Four soft keys with labels displayed on screen.

- Pop-up menus, displayed on-screen, from which options are selected.
- Database lists, displayed on-screen, which enable editing of items.

Note: *The cursor is the cross-hair symbol (+) visible on the display. The trackpad moves the cursor to select a position or item on the chart.*

The controls are shown in *Figure 1-1*. They are back-lit for night-time use. When you use certain controls, a help message is displayed at the top of the screen (unless you switch help off as described in *Chapter 4*). The following paragraphs describe the controls and on-screen facilities.
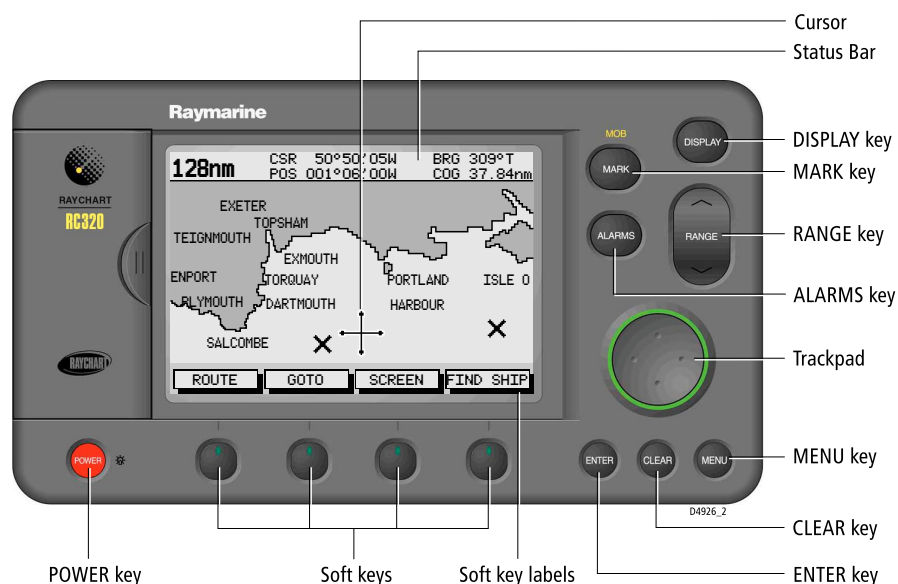
Figure 1-1: Raychart 320 Chartplotter Operating Controls

Trackpad and Cursor

The trackpad is used to:

- Move the cursor around the screen
- Select an item from a pop-up menu
- Adjust a variable soft key control

The cursor is used to:

- Select a position on the screen.
- Select, access and, if valid, move an item, eg. a waypoint, on the chart.
- Select an area of the screen to zoom into.
- Pan the display.

Moving the Cursor

Press the corresponding edge of the trackpad to move the cursor horizontally, vertically or diagonally; the longer you press, the faster the cursor moves. The current cursor position is shown in the Status Bar at the top of the display.

Note: *When certain menus and soft keys are displayed, the cursor is not active. If you find that you cannot move the cursor, it may be because the unit is in one of these modes. Press* CLEAR *(repeatedly) until the default soft keys are displayed; the cursor should then respond.*

Context-Sensitive Cursor Control

The cursor is context-sensitive. Some items on the screen, such as waypoints and chart objects have information associated with them. When you place the cursor over such objects, the information is displayed in a pop-up box. In addition, soft keys are displayed for certain items. For example, when you place the cursor over a waypoint, the waypoint data is displayed in a pop-up box and the waypoint soft keys are displayed.

When the cursor is positioned over special features on the display a text label appears below the cursor, identifying the feature as follows:

Text Label	Feature
BOX	Data box (any type)
MOB	Man Over Board marker
WPT	Chart Waypoint
COG	Course Over Ground vector
HDG	Heading vector
POS	Vessel's position
RTE	Route leg
TIDE	Tide vector
Chart Icons	Various

Dedicated Keys

The dedicated keys: **DISPLAY, MARK, RANGE, ALARMS, ENTER, CLEAR, MENU** and **POWER** have fixed functions.

Some keys can be used in two ways:

- **Press:** Press the key momentarily and then release it. This method is used for most key operations.
- **Press and hold:** Press the key and hold it down for the length of time stated (for example, 3 seconds), then release it.

When you press a dedicated key, one of the following happens:

1. The associated operation is actioned, eg. change chart scale (RANGE).
2. A pop-up menu is displayed, providing further options.
3. A set of soft keys is displayed, providing further functions.

As you press a key, a single audio beep confirms the key action. If the key-press is invalid for the current screen or mode, three rapid beeps sound. If required, you can turn these sounds off as part of your set up procedure (see *Chapter 4*).

Soft Keys

The four keys below the screen are called soft keys because their functions change according to the operation. The soft keys are grouped into related sets and subsets providing access to the various functions. The soft key labels are displayed on the screen just above the keys. The default soft keys are displayed until you press a key, or select an item on the screen; the soft keys associated with the action are then displayed as shown in *Figure 1-2*.

ROUTE	GOTO	SCREEN	FIND SHIP

D4897-1
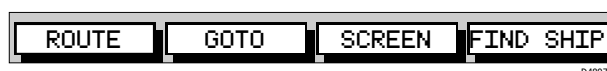
Figure 1-2: Default Soft Keys

Note: *If the key text is greyed out, it is not currently available.*

When you press a soft key, one of the following happens:

1. The associated operation is actioned.
2. A sub-set of soft keys is displayed, providing further functions.
3. A pop-up menu is displayed, providing further options.

As with dedicated keys, soft key operations are confirmed (or denied) by key beeps, see *Dedicated Keys* above.

Pop-Up Menus

Pop-up menus usually provide set up options. When a pop-up menu is on-screen, a set of associated soft keys is also displayed as shown in *Figure 1-3*.

```
        ALARMS SET UP

ARRIVAL ALARM          0.01nm
OFF TRACK ALARM        ON
ANCHOR ALARM           OFF
COUNTDOWN              00:10:00
ALARM CLOCK            OFF
```

```
 ALARM       SELECT DISTANCE
OFF ON          ▼        ▲
```

D4898_1
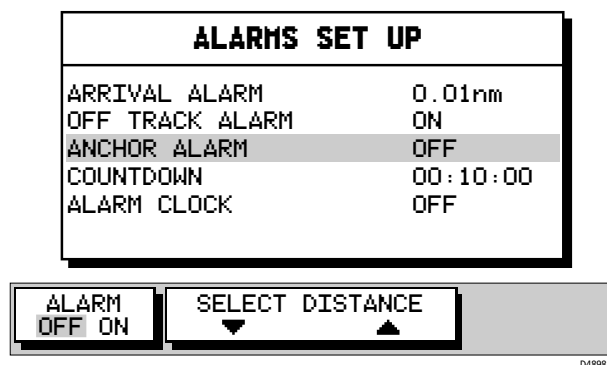
Figure 1-3: Typical Pop-up Menu

Use the trackpad to select an option from the menu, then use the
appropriate soft key to set the option. For example, you can toggle the
ANCHOR ALARM on/off using the soft keys.

Database Lists

The waypoints, routes and tracks created on the display unit are stored in
database lists. You can view these lists and select items for editing as
shown in *Figure 1-4*.

```
        WAYPOINT LIST
    SYMBOL          NAME

      ⚓        WAYPOINT 001
      X         WAYPOINT 002
      X         WAYPOINT 003
      X         WAYPOINT 004
POSITION        50°50'000N
                001°06'000W
BRG   348°m    RNG   1.00nm
TEMP   20°C    DEPTH 12.3m
DATE  23/11/00 TIME   08:45
```

```
  GOTO      EDIT    MAKE NEW  WAYPOINT
WAYPOINT  WAYPOINT  WAYPOINT  TRANSFER
```

D4906-1
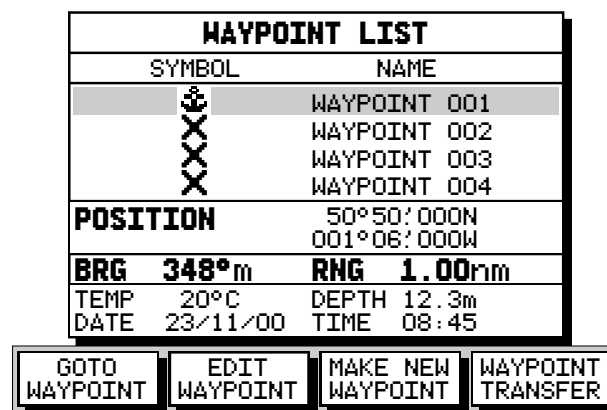
Figure 1-4: Typical Waypoint List

As with pop-up menus, when a database list is on-screen, a set of
associated soft keys is also displayed. Use the trackpad to select an item
from the list, then use the appropriate soft key to select the function.

Chapter 2: Getting Started

2.1 Introduction

This chapter provides information, instructions and a simple familiarization exercise in using the display. Operating information is detailed in *Chapter 3*.

Conventions Used

Throughout this handbook, the dedicated (labelled) keys are shown in bold capitals; for example, **ENTER**. The soft key functions, menu names and options are shown in normal capitals; for example, SCREEN.

Operating procedures, which may consist of a single key-press or a sequence of numbered steps, are indicated by a ➤ symbol in the margin.

Simulator

The Chartplotter display unit includes a *Simulator* mode, which allows you to practice operating your chartplotter without data from a GPS antenna. You will need to use the set up options to switch the display unit to *Simulator* mode, see *Section 2.2, Power On/Off*. You can use it in either of two ways:

*   Before the chartplotter has been installed on your vessel. In this case, you only need to connect the Chartplotter display unit to a 12V DC power supply, fused at 1A, connecting the red core from the power lead to positive (+) and the black core to negative (-); see *Chapter 5* for full details.
*   After the chartplotter has been installed on your vessel, but while in the marina or at anchor.

2.2 Power On/Off

Note: *After having used the Chartplotter for the first time, it powers-up in the last used mode.*

➤ To turn the display unit on, press the **POWER** key.

The keys light up, the display unit beeps and the introductory logo is displayed.

The GPS Status screen is displayed as shown in *Figure 2-1*.
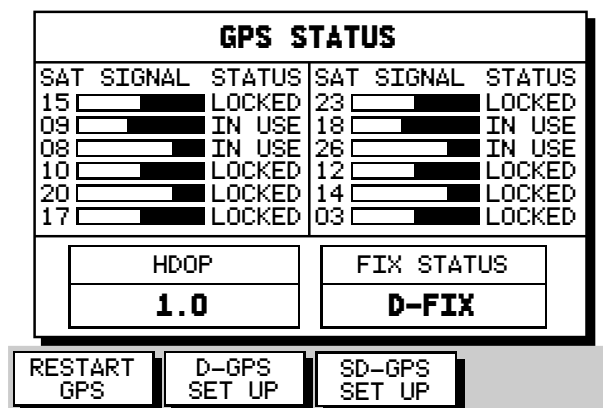
Figure 2-1: GPS Status Screen

The GPS Status screen is displayed until a satellite fix has been acquired. When satellite acquisition is complete, the READY FOR NAVIGATION pop-up box displays for two seconds; to clear the pop-up, press any key.

To proceed whilst satellite acquisition continues, press the **CLEAR** key; the cautionary text shown in *Figure 2-2* is displayed:
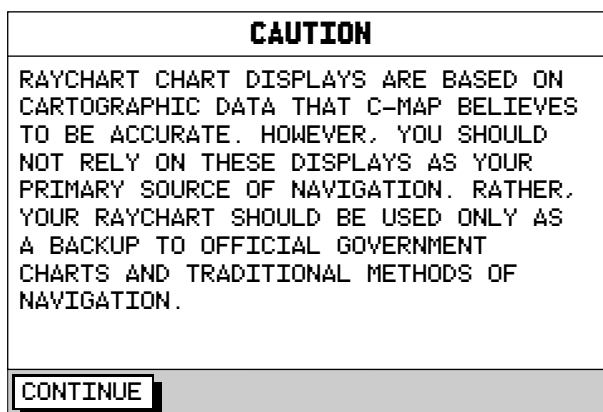
Figure 2-2: Power-on Caution

When you have read and understood the caution, press the CONTINUE soft key.

If this is the first time that the Chartplotter has been used, and no chart card is installed, the display shows the world map at Lat 0°/Lon 0° together with the default soft keys as shown in *Figure 2-3*. Otherwise, the display shows the selected chart area and any data that were displayed when the display unit was last used.
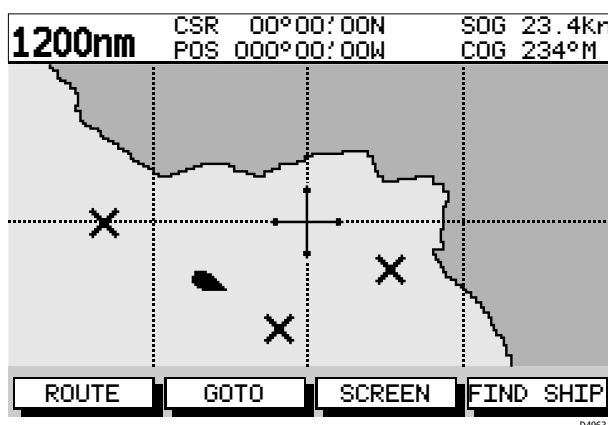
Figure 2-3: Chartplotter Default Display

➤ To switch the display unit off, press and hold the **POWER** key for at least three seconds. A 3-second countdown timer is displayed; when it reaches zero the display and key backlights extinguish. If the **POWER** key is released within this period, power-down is cancelled.

Changing the Lighting and Contrast

You can change the level of backlighting and contrast for the screen and keys. The key backlighting always retains a minimal level to enable the keys to be seen at night.

➤ To change the lighting and contrast:

1. Press the **POWER** key to display the lighting controls (*Figure 2-4*).
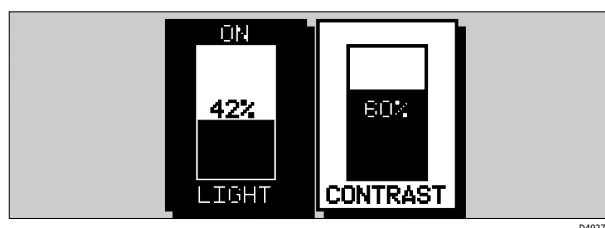
Figure 2-4: Lighting Controls

2. Use the LIGHT soft key or trackpad left/right to select LIGHT control.
   - Use the LIGHT soft key to toggle lighting ON/OFF.
   - Use trackpad up/down to select lighting level (eight levels).
3. Press the CONTRAST soft key, or trackpad left/right, to select the CON-TRAST control. Adjust the contrast setting in the same way as for the lighting. (16 contrast levels).

4. Press **ENTER** to remove the soft key sliders and return to the default screen, with the new lighting and contrast levels retained.

When the display unit is switched on, screen lighting is restored to ON if it was ON previously. Whilst the unit is switched on, the chosen lighting level is retained until it is reset. The new contrast level is retained until it is reset, even after power-off, unless it has been set either very low or very high; in this case, the contrast will be restored on power-up as follows:

*   Contrast set <30% restored to 30%
*   Contrast set >70% restored to 70%

Note: *Factory default settings are* LIGHT OFF *and* CONTRAST 50%.

2.3 Controlling the Display

The display is controlled by means of the cursor and control keys. Most chart operations are started from the default soft keys (*Figure 2-5*).

ROUTE	GOTO	SCREEN	FIND SHIP

D4897-1

Figure 2-5: Default Soft Keys

On completion of an action using the soft keys, press **CLEAR** to return to the default screen; you may need to press **CLEAR** several times to back-track through the soft key hierarchy.

Note: *If you have set up your system so that the default soft keys are not permanently displayed, press any soft key to display the labels.*

Selecting the Display Mode

The **DISPLAY** key is used to select the desired display mode. The following modes can be selected.

➤ Select the following modes by repeat presses of the **DISPLAY** key (*Figure 2-6*):

*   Chart display
*   GPS Data (four pages)/Waypoint Data (three pages)
*   Boat Data (three pages)/Environment Data (two pages)
*   Bearing/Distance Indicator (BDI)/Course Deviation Indicator (CDI)
*   Data Boxes
*   Data Log
*   Return to Chart display

Note: *On first use of the Chartplotter, the default display will be the Chart display. On subsequent power-up, the displayed page is that which was last used in the above sequence.*

Press

POWER

... after preliminary displays, the default display is shown

128nm	CSR 50°50′05W	BRG 309°T
	POS 001°06′00W	COG 37.84nm

EXETER
TOPSHAM
TEIGNMOUTH
EXMOUTH
ENPORT
TORQUAY
PORTLAND
ISLE O
PLYMOUTH
DARTMOUTH
HARBOUR
SALCOMBE

ROUTE	GOTO	SCREEN	FIND SHIP

Press **DISPLAY** to return to Chart Display

Press **DISPLAY** to show GPS/Waypoint Data

Waypoint data

GPS data

SD-FIX

50°50′000W

001°06′000W

▶▶ STEER STARBOARD
WPT 004

WPT BRG	352°M
WPT RNG	0.55nm
COG	050°M
SOG	12.0kts

ROUTE	GOTO	GPS DATA	WPT DATA

TIME	POSITION	CMG	DMG
09:00	50°50′000N	239°m	4.8nm
20/12	001°06′000W		
09:30	50°51′000N	241°m	5.2nm
20/12	001°07′000W		
10:00	50°52′000N	240°m	4.5nm
20/12	001°08′000W		

ROUTE	GOTO	STOP LOG	CLEAR LOG

Note: In any display mode press DISPLAY key for 2 seconds to return to default display.

Press **DISPLAY** to show Boat/Environment Data

Press **DISPLAY** to show Data Log

Environment data

Boat data

TRUE WIND

SD-FIX

DEPTH **12.5**m

SPEED **11**kts

▶▶ STEER STARBOARD
WPT 004

WPT BRG	320°M
WPT RNG	0.55nm
COG	050°M
SOG	12.0kts

ROUTE	GOTO	BOAT DATA	ENVIROMNT

WPT RNG	WPT BRG	PILOT
28.7	28.7	MANUAL
TIME	SPEED	COG
01:40:18	17.6	17.6
DEPTH	POSITION	SOG
28.7	50°50′000N 001°06′000W	15.1

ROUTE	GOTO		

225°T

355°T

XTE	0.05nm
XTE	0.05nm
WPT BRG	300°T
WPT RNG	23.2nm
TTG	04h 12m

▶▶ STEER STARBOARD
WPT 004

ROUTE	GOTO	CDI	BDI

Press **DISPLAY** to show Data Boxes
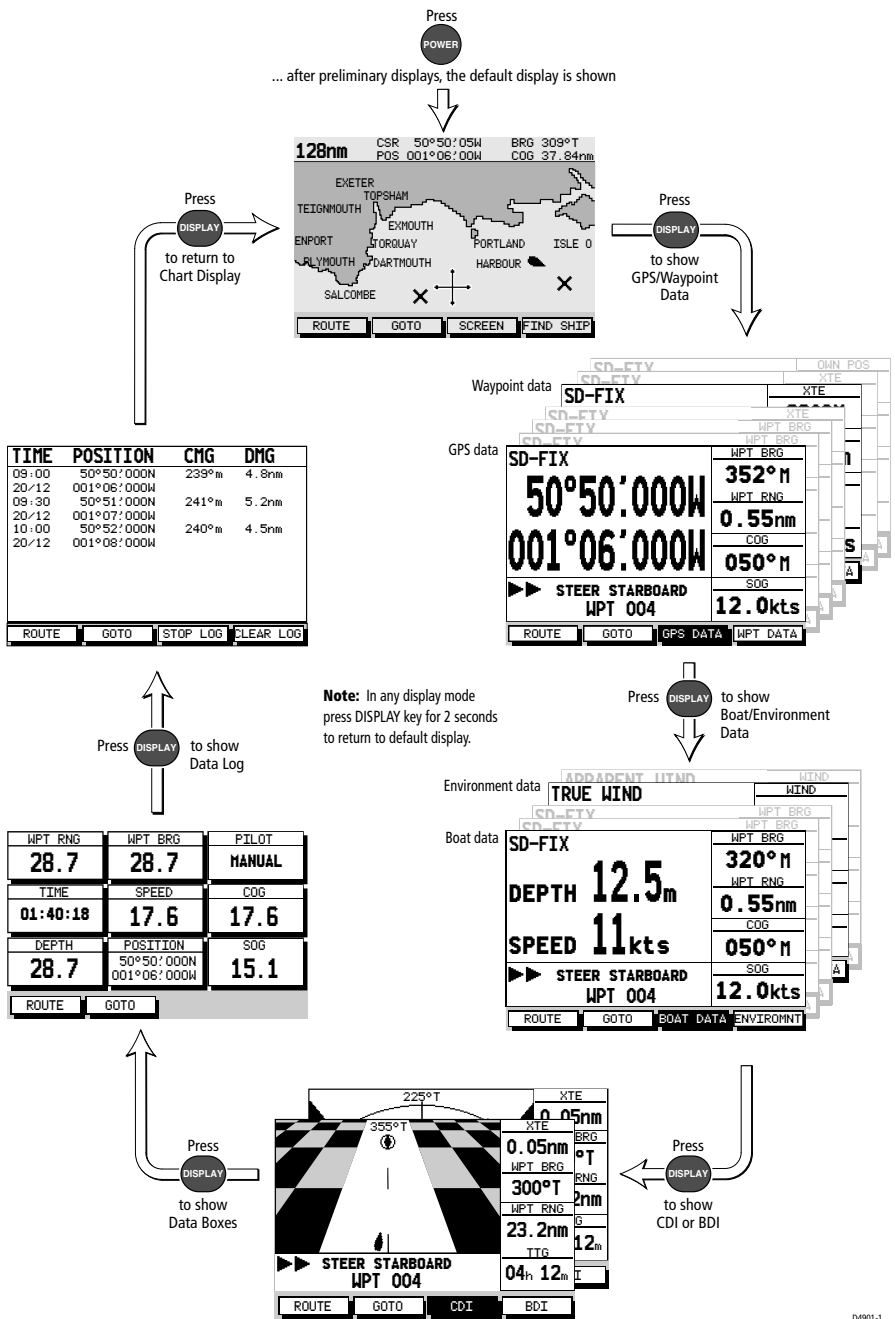
Press **DISPLAY** to show CDI or BDI

D4901-1

Figure 2-6: Display Modes

In default screen, press **MENU** to display all the Setup soft keys. Press **CLEAR** to remove the Setup soft keys.

Note: *In all other modes, pressing* **MENU** *displays only the soft keys appropriate to those modes, ie.* SYSTEM SET UP *and* GPS SET UP.

2.4 Chart Display Control Functions

Using the Chart Display

You will normally operate the Chartplotter with the display showing your vessel's current location.

Chart Operations Using GPS Navigation Data Pages

Amongst a number of information pages, the GPS Data pages provide a series of four textual displays, selected by the associated soft key. These provide essential navigational information.

*   Fix status
*   Steering Indication
*   Position Latitude/Longitude
*   Waypoint Bearing and Range
*   Course Over Ground (COG)
*   Speed Over Ground (SOG)
*   Current Time
*   Sunrise and Sunset Times
*   Twilight Times

The range of pages is listed in *Selecting the Display Mode* on *page 4* and illustrated in *Figure 2-6*. The complete range of pages is described fully in *Chapter 3, Operation*.

Moving Around the Chart Screen

When using the chartplotter screen, the default orientation is North-Up, where the vessel moves across the screen. You will need to pan the display if your vessel moves out of the current area, or if you wish to examine or place waypoints in another area. Alternatively, you can *home* the cursor onto the vessel using FIND SHIP.

There are four ways in which you can move around the display:

*   Use the trackpad to pan the display.
*   Automatically home (re-center) the vessel using the FIND SHIP soft key.

- Change the display scale to zoom out and in to a new area centered on the cursor position. This method is useful if the area you wish to see is a long distance away.
- Use the context-sensitive cursor to change the display center.

Panning the Display

Panning the display is useful if the area you wish to see is only just off the screen.

➤ Use the trackpad to move the cursor to the edge of the display; the display will pan across.

Using FIND SHIP

FIND SHIP is used to center the vessel on the screen, even if it is currently off screen:

➤ Press the FIND SHIP soft key; the following actions occur:

- The display is re-drawn with the vessel's position in the center.
- The cursor is homed (locked) to the vessel's position and moves with it.
- When the vessel moves near the edge of the screen, the display is redrawn to place the vessel and cursor at the center.
- Whilst homed, the status bar indicates vessel position, speed and course over ground.

➤ To release the cursor from homed mode, use the trackpad to move the cursor away from the vessel's current position. The status bar shows the current cursor position, bearing and range. The cursor no longer moves with the vessel and no redraw occurs if the vessel moves off screen.

Changing the Chart Range

The **RANGE** key allows you to change the display scale so that you can see a smaller or larger area on the screen.

Plotter mode is available to allow you to zoom into a smaller area, even when no chart data is available for that scale. *Chapter 4* describes how to set plotter mode on/off.

You can change the display scale:

- To see either a larger scale (of a smaller area) or a larger area (at a smaller scale) on the screen.
- To move the display to another area, by zooming out to a smaller scale, then zooming in on another position centered on the cursor.

Each time you press the **RANGE** key, the display scale changes to the next available setting. The status bar, shown in *Figure 2-7*, indicates the distance from top to bottom of the screen, in nautical miles.
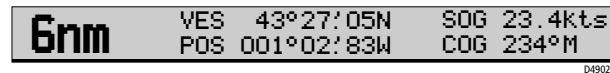

Figure 2-7: Status Bar

➤ To change the scale rapidly, press and hold top or bottom of the **RANGE** key.

The distance indicator at the left-hand side of the status bar is updated whenever you change the display scale.

➤ To zoom in to a larger-scale (more detailed) display:

1. Use the trackpad to position the cursor in the area you wish to see in larger scale.
2. Press the bottom of the **RANGE** key to zoom into the area.
    The display, centered on the cursor, is enlarged to show a larger scale and the distance indicated in the status bar is updated.
3. If further chart detail is available, using the current chart card you can press the bottom of the **RANGE** key to zoom in further, first re-positioning the cursor if required. An area of further chart detail is indicated by a box around the area as shown in *Figure 2-8*.

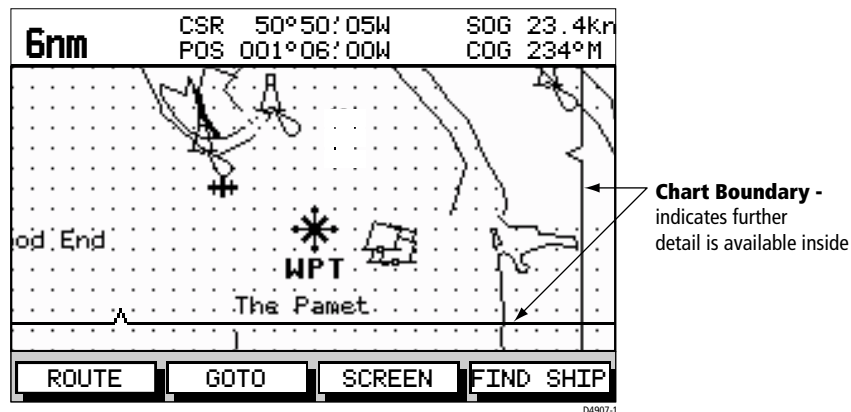**Chart Boundary -** indicates further detail is available inside

Figure 2-8: Chart Detail Boundaries

4. When the bottom of the **RANGE** key is pressed and no further chart detail is available, the result depends on whether **Plotter Mode** is on or off as follows:
    *   If Plotter Mode is Off, the chart scale remains unchanged, ie. the smallest chart scale is displayed.

- If Plotter Mode is On, the scale is decreased and the message NO CHART DATA is displayed. The vessel, waypoints, routes and tracks are displayed without cartography.

The chart information is restored when you return to a chart scale for which the information is available.

➤ To zoom out to a smaller-scale (less detailed) display, press the top of the **RANGE** key as many times as required, up to the maximum scale of 2400nm.

Changing the Display Center

You can move the area of the display center using the context-sensitive cursor. This allows you to center your vessel in the center of the screen, or to move the display so that your vessel is displayed off-center anywhere on the screen.

➤ To move your vessel's position off-center:

1. Move the cursor over your vessel's position until the letters POS are displayed.
2. Press **ENTER** to take control of the vessel's position. The letters POS are now in inverse video and the cursor symbol has changed to a four-way arrow. This indicates that the cursor can be used to move the display in any direction.
3. Use the trackpad to move the cursor to the required position.
4. Press **ENTER** to select the position and return to normal cursor control. The display is redrawn with the vessel's position at the cursor. Alternatively, you can press **CLEAR** to abandon the move and leave the display (and vessel) in its former position.

➤ To center the display:

1. Use the trackpad to move the cursor to the vessel's position. The cursor text POS is displayed.
2. Press **CLEAR**. The display pans to show your vessel's position is in the center of the screen.

Customizing the Display Options

The SCREEN soft key enables the following screen display options to be set on or off:

- Cursor Box (CRSR BOX)
- Chart Grid (CHRTGRID)
- Personalized (CUSTOM)

Switching the Cursor Data Box On/off

The cursor data box provides the cursor's position in latitude/longitude and/or bearing/range.To see a full image, switch the data box off.

➤ To control the cursor data box:

1. Press the SCREEN soft key.
2. Press the CRSR BOX soft key to toggle the setting between OFF and ON.

To return to the default soft key display, press **CLEAR**.

➤ To move the cursor box:

1. Use the trackpad to position the cursor over the box until the letters BOX are displayed.
2. Press **ENTER** to take control of the box, use the trackpad to move it to the required position and press **ENTER** again.

Switching Chart Grid On/off

The Chartplotter display can be set to show grid lines of latitude and longitude which can help determine position on the chart.

➤ To turn thechart grid on or off:

1. Press the SCREEN default soft key.
2. Press the CHRT GRID soft key to toggle the setting OFF and ON.
3. To return to the default soft key display, press **CLEAR**.

Custom Options - Chart mode

When chart details have been customized in the Chart Set Up menu (as described in *Chapter 4*) the SCREEN soft key can be used to switch the custom chart options OFF or ON.

When set to ON, all chart options set to CUSTOM in the Customize Chart menu are displayed; when set to OFF, options set to CUSTOM are not shown.

The factory default for custom chart options is ON.

➤ To switch the customized options on or off:

1. Press the SCREEN default soft key.
2. Press the CUSTOM soft key to toggle the setting between OFF and ON.

To return to the default soft key display, press **ENTER**.

Simulator Mode

When simulator mode is started, your initial simulated position is wherever the cursor was last positioned. To practice using the

Chartplotter in a particularchart area, use the trackpad to pan to that area, then switch simulator ON.

Note: *If real position data is available (via GPS) and the simulator is active, simulated data takes precedence. On power-up the simulator defaults to its previous setting on power-down.* ***Care should be taken to determine desired mode on power-up.***

Simulated data should never be used for navigational purposes. Any waypoints placed on the chartplotter in simulator mode are retained in the Waypoint List and are available for use in routes.

➤ To view a simulated display:

1. Press **MENU** followed by the SYSTEM SET UP soft key. The system set up menu pop-up is displayed.
2. Use the trackpad up/down to move the selection bar over the option SIMULATOR. The simulator soft keys are displayed.
3. Press the ON soft key to start simulation.
4. Press **ENTER** twice to return to the default display.

Chapter 3: Operation

3.1 Introduction

This chapter explains how to navigate with the Raychart 320 Chartplotter. It covers the following topics:

- Using electronic chart cards.
- Controlling waypoints, including placing, moving, editing and deleting waypoints.
- Changing the display mode
  - Using a range of data pages to display navigation data
  - Maintaining a Data Log of Time, Position, Course Made Good (CMG) and Distance Made Good (DMG)
- Working with waypoints and routes, including creating a new route, managing routes using the Route List and editing routes.
- Following routes and going to waypoints.
- Transferring waypoints and routes
- Using tracks, including showing tracks, track set up, saving tracks and converting a track to a route (*SmartRoute*).
- Using the Man Overboard (MOB) feature.
- Displaying information from other equipment

These chart functions are available in plotter mode, so you can plot and track routes at large scales even when a chart card is not installed.

CAUTION:

The Chartplotter makes it easy to place a waypoint and travel towards it. However, you should always check first that the route is safe. If you are using the Chartplotter in combination with a SeaTalk autopilot, the autopilot will prompt for confirmation before it steers the vessel towards the waypoint.

If you have entered your route using a small-scale chart, zoom in to a larger scale to check for hazards, such as small shoals, that may not be shown on the smaller scale charts.

Note: *Until you are familiar with interpreting the chart display, you should take every opportunity to compare the displayed objects with visual targets, such as buoys and coastal structures. You should practice harbour and coastal navigation during daylight and in clear weather conditions.*

CAUTION:
The equipment should not be used as a substitute for good
navigational practice nor for official government paper charts.

3.2 Using Chart Cards

The chartplotter has a built-in world map; most areas are covered on a scale of 8nm on the screen. To use the chartplotter as a navigation aid, charts with detailed information for the area you wish to navigate are required. The charts are available on C-MAP NT electronic chart cards (C-Cards), each of which can store as many as 20 charts in an electronic format. A single C-MAP chart normally provides as much information as is available in paper charts for that geographic area.

Two card slots are provided on the display unit. Chart data from both slots can be up/downloaded.

.At the top of the chart screen a status bar displays the scale in use - the number represents the distance (in nautical miles) displayed from the top to bottom of the screen.

Note: *You can remove and insert cards while a chart is displayed. The chart information is retained on-screen until the chartplotter redraws the screen: for example, when you pan outside the current area, or use the* **RANGE** *key to change the chart scale.*

Data on a chart card is also available to a repeater display, which can be used independently of the master. When the master display is switched off chart data is retained on the repeater screen until the chart is redrawn.

Inserting a Chart Card

➤ Refer to *Figure 3-1*:

1. Check that the card is a C-MAP NT C-Card with the required chart stored in it.
2. Open the card cover, at the lower left of the display front panel.
3. Hold the card with the title label towards the left, as shown in *Figure 3-1*.
4. Gently push the card into one of the two slots. It will only fit if it is the correct way round. Push the card in as far as it will go, then move it to the right so that the top is under the retaining pegs. The card will be held in place by the pegs.
5. To prevent the ingress of water, close the card cover so that is clicks shut.
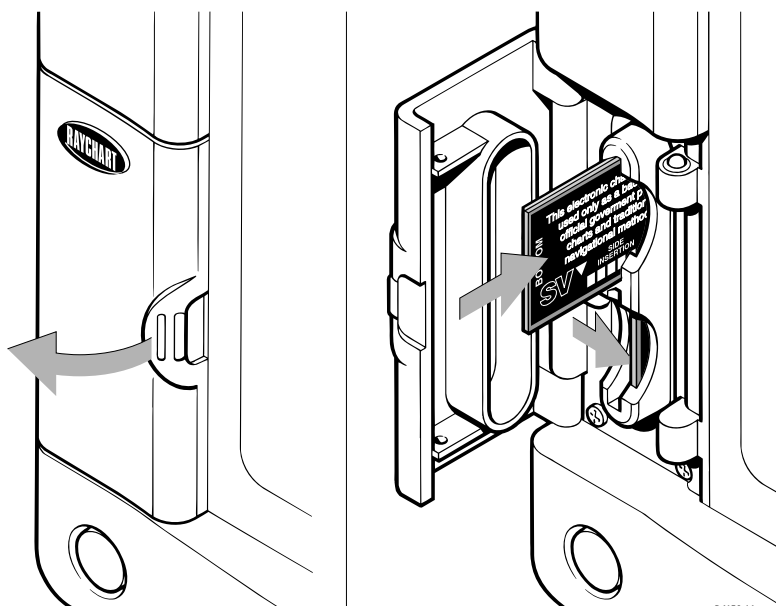
Figure 3-1: Chart Card Insertion/Removal

Removing a Chart Card

➤ Refer to *Figure 3-1*:

1. Open the card cover, at the lower left of the display front panel.
2. On the card you wish to remove, press down and move the top of the card to the left to clear the retaining pegs.
   The card will spring part-way out, enabling you to grip and remove it from its slot.
3. To prevent the ingress of water, close the card cover so that it clicks shut.

Displaying the Chart Data

The new chart information will be displayed when you move the cursor into an area covered by the new chart or, if it is already in the area, change the scale.

If a chart repeater is connected, the chart can also be accessed by the repeater display. To see the chart, you may need to zoom or pan, to redraw the chart area to the screen.

The boundary of each chart digitized in the current card is defined by a box or rectangle. (You can switch off the chart boundaries display if you wish, as part of the chartplotter set up described in *Chapter 4*).

➤ To zoom in:

1. Use the trackpad to move the cursor inside one of the chart boxes, and press the lower part of the **RANGE** key.

   That area is expanded, with the cursor at the centre, so that you can see more detail. Note that the smaller the chart box is on the screen, the greater the amount of detail that is available when you zoom in.

   If you have switched on **Plotter Mode** (see *Chapter 4*), you can zoom in further than the most detailed chart; all chart functions remain available.

Displaying Object Information

Chart cards include a number of displayed objects for which information is available, such as lights and buoys. If your chart includes port and tide data, this can be displayed along with information for the nearest port facility (for a selected position). Chart source data is also available. The context-sensitive cursor is used to select the object and display detailed information.

➤ To obtain the chart object, port or tide information:

1. Move the cursor over the symbol for which you require the information. An Object data box such as the following is displayed at the lower left corner of the screen as shown in *Figure 3-2*:
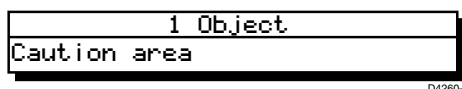
```
                1 Object
Caution area
```
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Figure 3-2: Typical Object Data Box

2. To view further details, press **ENTER**.

   The details available are listed on-screen in an object information pop-up.

3. Use the trackpad to move the selection bar over the required item then press **ENTER** to display the full details.

4. Press **CLEAR** to remove the pop-up from the screen.

Chart Source Data

The chart card contains additional background data for most chart objects, icons, lines, open sea areas etc. Some of these items automatically provide an information data box, as described above. For

other chart objects, such as bridges and territorial lines, you need to press **ENTER** to display the object information pop-up.

➤ To obtain chart source data:

1. Move the cursor so that is not over a symbol.
2. Press **ENTER**.

   An object information pop-up is displayed, providing source information for the selected land or depth area.

Port Area

At large chart scales **port area** information is indicated by the symbol. An object information pop-up provides the name of the marina or port and a list of the facilities available.

Where available, details for each facility can be displayed. This information includes items such as accommodation, slip sizes, fueling, sanitation, electrical or other maintenance services provided, VHF channels monitored, and other safety and navigation information.

In some areas the chart shows symbols for individual facilities. The facilities and their associated symbols are defined in *Figure 3-3*.

Figure 3-3: Port Facility Symbols

Tide Data

The symbol indicates that **tide height** data is available for that position on the chart. When you select the tide height option, a graph of predictions for maximum and minimum tide heights is displayed, data for sunrise and sunset is also provided as shown in *Figure 3-4*.

Note: *The predictions available are sufficiently accurate under moderate weather conditions, for the coastal areas served by the reference station, to be used for navigation planning. However, certain weather fronts and storms can alter tidal patterns and influence predicted times and heights.*
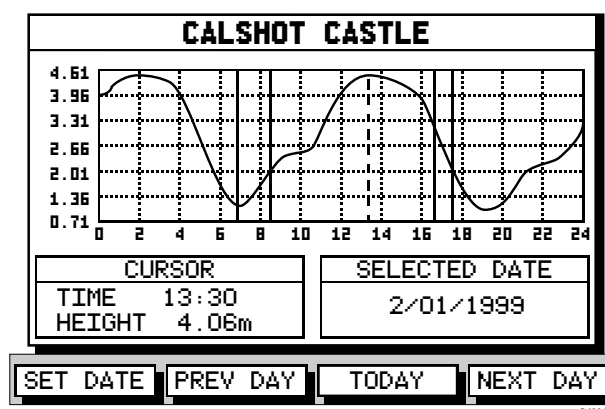
Figure 3-4: Tide Data Information

The cursor, represented by a dotted vertical line on the graph, is used to select a time for which the tide height is displayed.

You can use the soft keys and trackpad to change the date for which tide information is shown.

➤ To select a time, use the trackpad to move the cursor to the required time.

➤ To change the day press PREV. DAY, DAY or TODAY, as required.

Alternatively, press SET DAY. To change date, use the trackpad left/right to select the character and up/down to increase/decrease the value. The graph and tide data are updated accordingly.

Nearest

➤ To obtain the information for the nearest port facility:

1. Move the cursor to the required position - this can be anywhere on the chart and may be over an object.
2. Press **ENTER** to display the object information pop-up.
3. Press the NEAREST soft key. The port facility symbols are displayed.
4. Use the trackpad to highlight the required facility, then press **ENTER**. A list of the port(s) nearest to that facility is displayed, including distance and bearing to the port(s).
5. To find details for a facility, highlight a port name then press **ENTER**.
6. Press **CLEAR** to return to the port list.
7. Press **CLEAR** again to return to the facility symbols.
8. Press **CLEAR** once more to return to the default display.

3.3 Changing the Display Mode

The **DISPLAY** key is used to select the desired screen mode. If the data is available on your system, the following modes can be selected:

- Default Chart display
- GPS Data (four pages) / Waypoint Data (three pages)
- Boat Data (three pages) / Environment Data (two pages)
- Bearing & Distance Indicator (BDI) / Course Deviation Indicator (CDI)
- Data Boxes
- Data Log
- Return to default Chart display

Those modes containing more than one page of data display additional soft keys giving access to the sub-sets of data within each group, each cycled through with the associated soft key. The highlighted soft key indicates the data page currently displayed.

On first use of the Chartplotter, the default display will be the Chart display. On subsequent power-up, the displayed page is that which was last used in the above sequence.

Note: *Press the* **DISPLAY** *key for at least two seconds in any display mode to return to the default display.*

Data Display Pages

In all graphical display pages, the steering instruction is STEER STARBOARD if the XTE is 0.01nm or more to port, STEER PORT if the XTE is 0.01nm or more to starboard or ON COURSE if XTE is less than 0.01 on either side.

If no Goto or follow is in progress, the steering instruction is NOT TRACKING and no steering arrows are shown.

The arrows either side of the steering instruction and pointing towards it are dependent on the XTE. The first arrow is shown when the difference reaches 0.01nm and the second at 0.05nm.

Textual data provides Position, SOG, COG, Bearing and Range to waypoint, Time and Date, Time To Go (TTG), Steering Indicator, Sunrise, Sunset, Fix Status and XTE. Any unavailable data is replaced by dashes, one per character. When there is no GPS fix but there is a value for the last fix, this is shown instead.

The waypoint name is shown unless there is no target, in which case NOT TRACKING is shown. If the waypoint is part of a route, the waypoint index

in the route is also shown. If Goto cursor is in progress, GOTO CURSOR is shown.

The FIX status indicates GPS FIX for a standard GPS Fix, D-FIX for a differential fix, SD-FIX for a satellite differential fix, or NO FIX where a fix has not been achieved.

BRG, RNG and XTE data relate to the target waypoint.

Time refers to local time zone which is set in the System Set Up menu, see *Chapter 4*.

The Time To Go (TTG) and Estimated Time of Arrival (ETA) data relate to the target waypoint (not the whole route) and are based on the Speed Over Ground (SOG) towards the target. If the Velocity Made Good (VMG) is negative, or data is not available, these fields are replaced by dashes, one per character.

Sunrise and Sunset times are for today and at the vessel's position.

GPS/Waypoint Data

GPS Data

The GPS Data display comprises four text data pages, selected in turn by the GPS DATA soft key. These pages are shown in *Figure 3-5* to *Figure 3-8*.
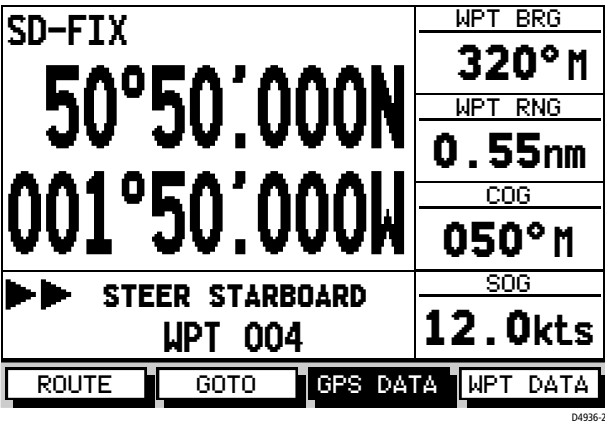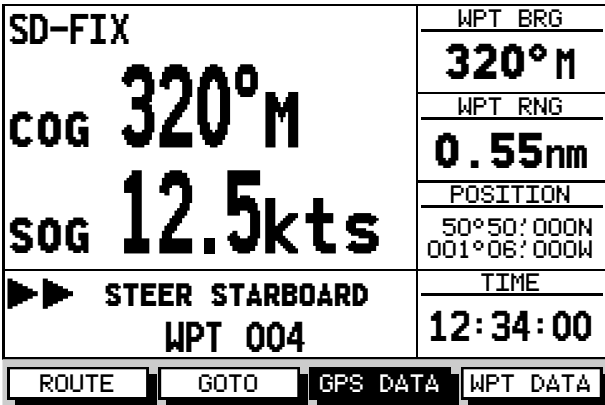

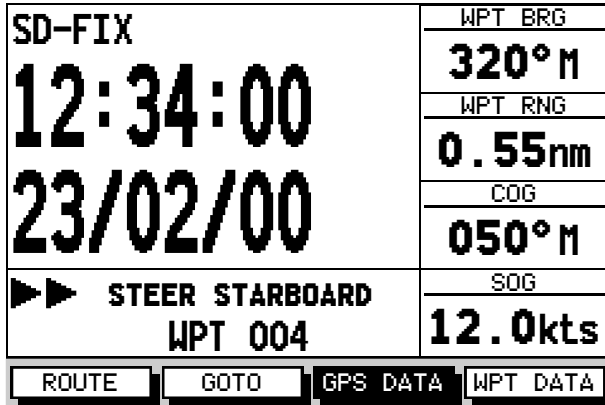**Figure 3-5: GPS Data Page #1**

Figure 3-6: GPS Data Page #2
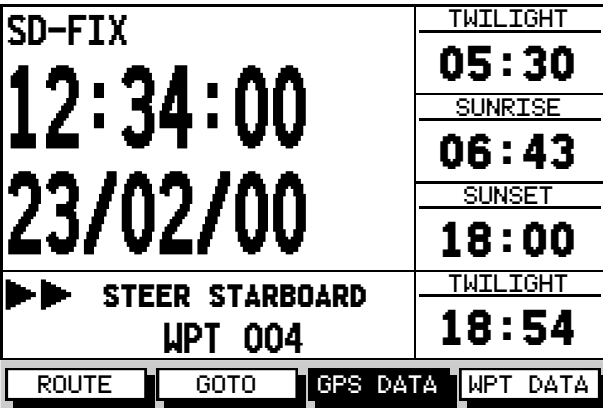

Figure 3-7: GPS Data Page #3

Figure 3-8: GPS Data Page #4

Waypoint Data

The Waypoint Data display comprises three data pages, selected in turn by the WPT DATA soft key. These pages are shown in *Figure 3-9* to *Figure 3-11*:

Figure 3-9: Waypoint Data #1

Figure 3-10: Waypoint Data #2
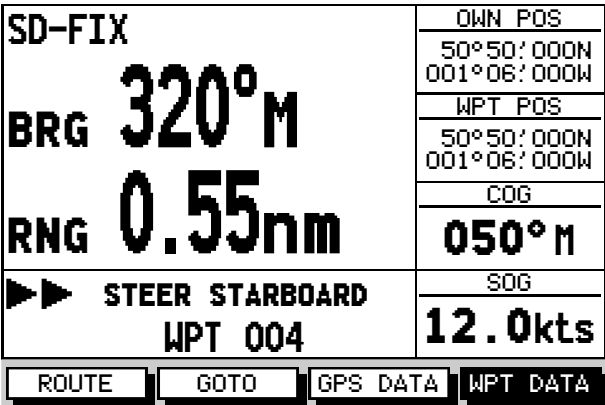
Figure 3-11: Waypoint Data #3

Boat/Environment Data

Boat Data

The Boat Data display comprises three data pages, selected in turn by the BOAT DATA soft key. These pages are shown in *Figure 3-12* to *Figure 3-14*:
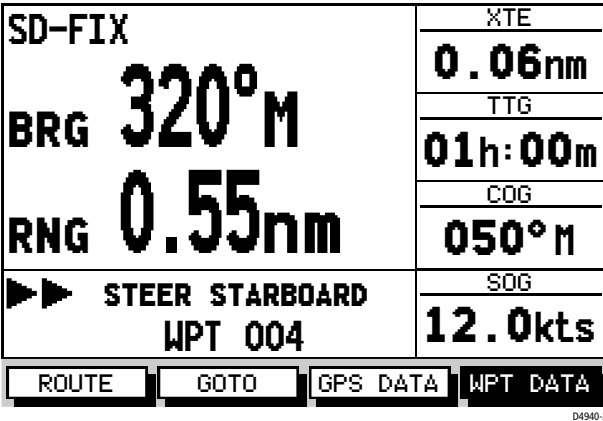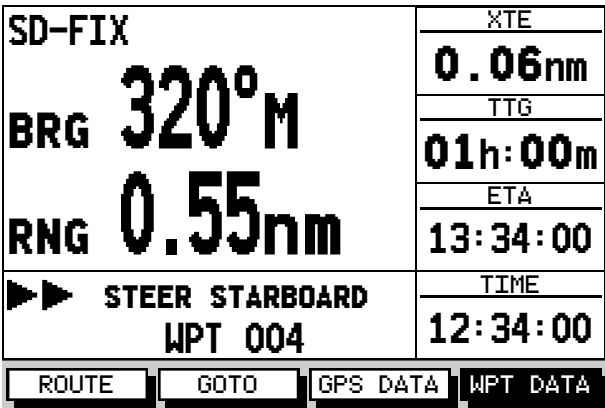
Figure 3-12: Boat Data #1
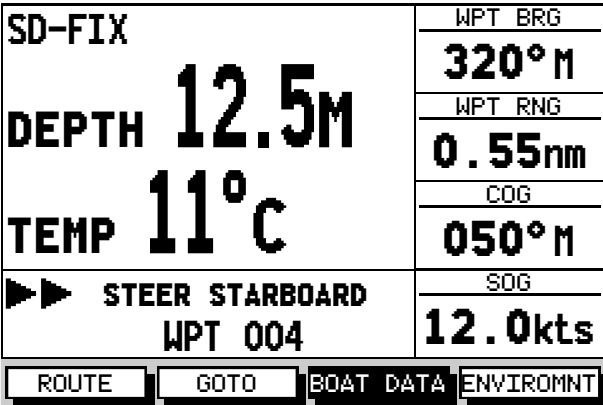
Figure 3-13: Boat Data #2

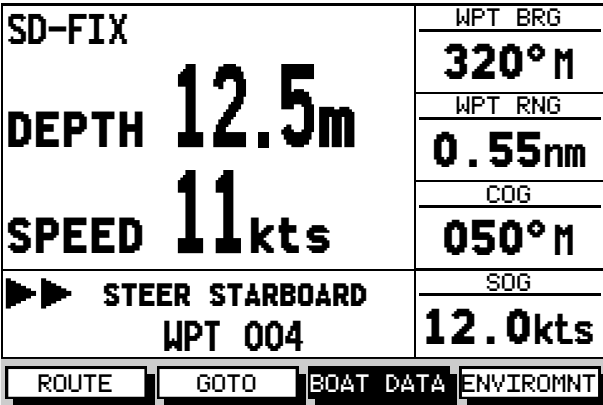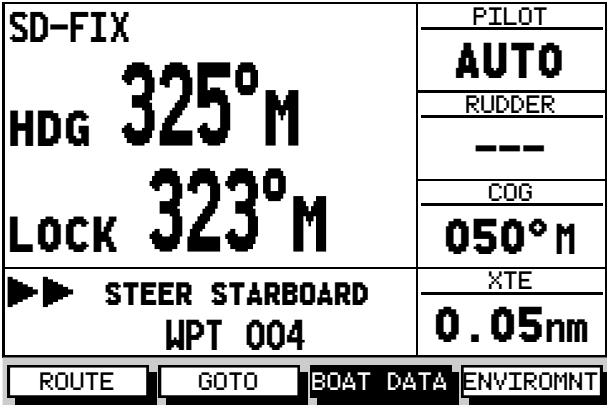**Figure 3-14: Boat Data #3**

Environment Data

The Environment Data display comprises two data pages, selected in turn by the ENVIRONMT soft key. These pages are shown in *Figure 3-15* and *Figure 3-16*.
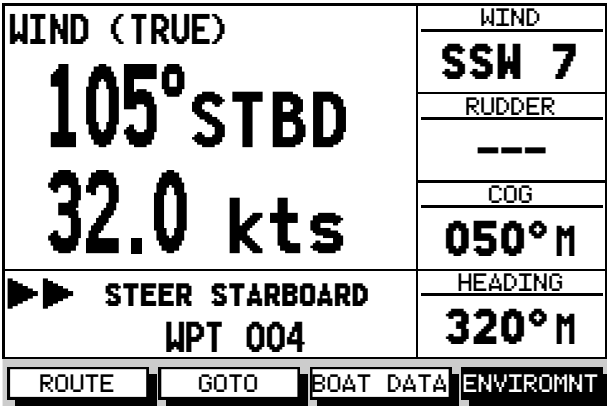
Figure 3-15: Environment Data #1
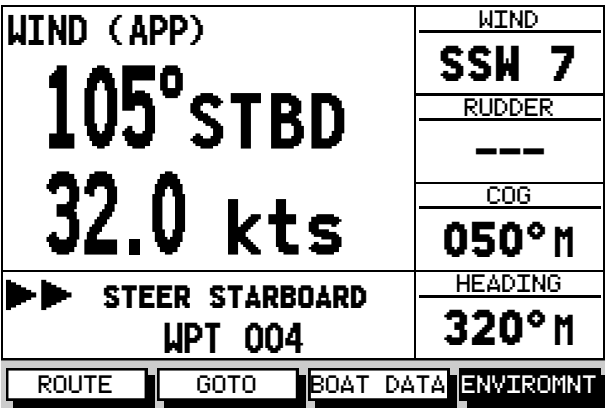
Figure 3-16: Environment Data #2

CDI/BDI Data

The Course Deviation Indicator (CDI) / Bearing Deviation Indicator (BDI) display comprises two data pages, selected alternately by the CDI and BDI soft keys. These pages are shown in *Figure 3-17* and *Figure 3-18*:

CDI Data

The CDI display shows Cross Track Error (XTE) and Distance to Waypoint presented in a 'runway' format as shown in *Figure 3-17*:

Figure 3-17: CDI Display

The 'runway' represents a 0.3nm width with the vessel symbol shown at the bottom. Individual text boxes show Cross Track Error (XTE),

Bearing to Waypoint, Distance to Waypoint and Time to Go (TTG). TTG is calculated on the basis of distance to destination and Velocity Made Good (VMG) towards destination.

At waypoint ranges greater than 4nm, the symbol remains at the top of the screen. As the waypoint range falls below 4nm, the symbol moves down the centre line.

The checkered pattern moves down the screen to simulate movement when SOG is greater than 2 knots (0.5knots if D-FIX or SD-FIX).

BDI Data

The BDI graphical display shows deviation from the Bearing to Waypoint and Distance to Waypoint as shown in *Figure 3-18*. Individual text boxes show Cross Track Error (XTE), Bearing to Waypoint, Distance to Waypoint, Time to Go (TTG). TTG is calculated on the basis of distance to destination and Velocity Made Good (VMG) towards destination.
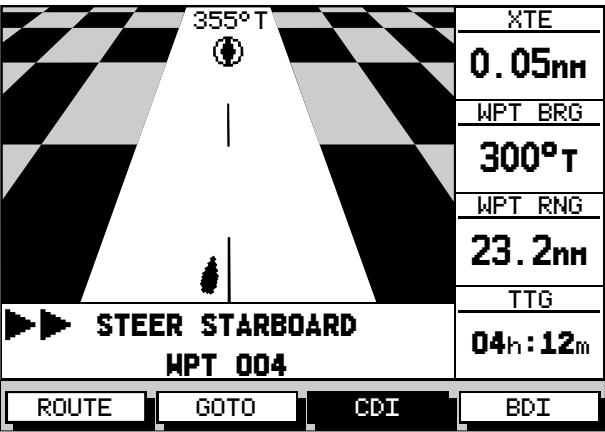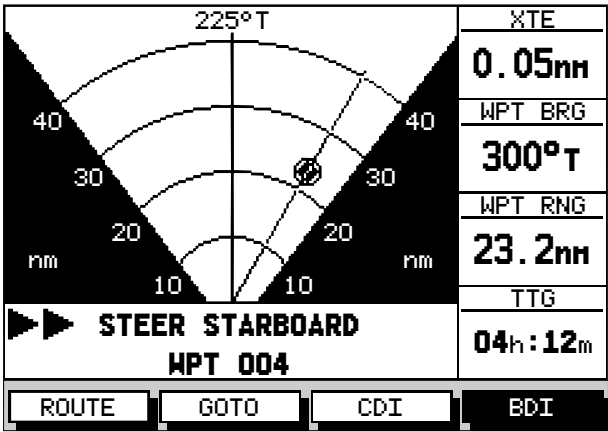

Figure 3-18: BDI Display

The line to the waypoint symbol is shown at an angle equal to the difference between the COG and the Bearing to Waypoint to a maximum of ±15°. The waypoint symbol is the symbol of the target waypoint as shown on the display.

The range scale automatically scales for distance. The ranges shown are 0.4nm, 4nm, 40nm and thence in decimal increments in the series 1, 2, 4, eg. 100nm, 200nm, 400nm, 1000nm, 2000nm, 4000nm. In each case the range scale has graduations at ¼, ½ and ¾ of the current scale.

Data Boxes

The Data Boxes display is shown in *Figure 3-19*.

Figure 3-19: Data Boxes Screen

Data Log

The Chartplotter can be set to log passage data every 30 minutes. Up to 48 log entries are held. When 48 entries have been saved, the first entries start being overwritten.

If the number of log entries exceeds the table size, use the trackpad up/down to scroll the list and view further log entries. Each line in the log shows:

- Time of log entry
- Position at time of log entry
- Course Made Good (CMG) since last log entry
- Distance Made Good (DMG) since last log entry

You can stop the log at any time and you can clear the log from memory.

➤ To use Data Log Mode:

1. Press **DISPLAY** repeatedly until the Data Log table is displayed.
2. Press the START LOG soft key to start logging; the START LOG soft key changes to STOP LOG.

At 30 minute intervals, the current time, vessel's position, distance made good (DMG) and course made good (CMG) are recorded as shown in *Figure 3-20*.

TIME	POSITION	CMG	DMG
09:00	50°50'000N	239°m	4.8nm
20/12	001°06'000W		
09:30	50°51'000N	241°m	5.2nm
20/12	001°07'000W		
10:00	50°52'000N	240°m	4.5nm
20/12	001°08'000W		

| ROUTE | GOTO | STOP LOG | CLEAR LOG |

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Figure 3-20: Data Log Screen

3.   Press the STOP LOG soft key to stop logging.

4.   Press the CLEAR LOG soft key to clear all log entries.

3.4 Working with Waypoints

Introduction

You can place up to 1000 waypoints on the Chartplotter.

A waypoint is a position entered on the chart as a reference or destination point. All waypoints *placed on the Chartplotter* are stored in a waypoint database list which includes symbol, position, bearing, range and additional data. All waypoints in the database are displayed on the screen, unless you set waypoint display off in the Chart Set Up menu, as described in *Chapter 4*. You can select a waypoint, either graphically or from the Waypoint List, for editing.

The waypoint is normally placed at the cursor position, but can also be placed at the vessel's current ; a waypoint placed at the vessel position includes additional information (if available) providing depth and temperature and time when it was placed. Any type of waypoint can be included in a route.

Note: *You can place waypoints before you install the Chartplotter on your vessel.*

When a new waypoint is placed, it uses either the factory default symbol (a cross) or an alternative symbol available from the Set Up menu, see *Chapter 4*. The waypoint is added to the Waypoint List and tagged with the next available number. You can use the edit functions to change the

symbol and name. When the cursor is positioned over a waypoint, the waypoint bearing and range are displayed in a pop-up box.

Waypoints in the current route are available on other SeaTalk instruments that support current route transfer, for example, an ST80 Masterview. You can also transfer waypoints between the Chartplotter and other NMEA or SeaTalk instruments using the Waypoint Transfer functions.

This section explains how to perform the following tasks using the on-screen cursor and the waypoint list:

- Placing a Waypoint
- Selecting a Waypoint
- Displaying Waypoint data
- Editing a Waypoint (symbol, name & position)
- Erasing a Waypoint
- Moving a Waypoint

Placing a Waypoint

➤ To access the place waypoint soft keys, press **MARK**; the Place Waypoint soft keys are displayed as shown in *Figure 3-21*:

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Figure 3-21: Waypoint Soft Keys

➤ To place a waypoint at the cursor (chartplotter screen) or the vessel's position:

1. Press either the PLACE WPT AT CURSOR or the PLACE WPT AT VESSEL soft key. The waypoint is added to the waypoint list and tagged using the next available number.

   The waypoint soft keys are displayed until you move the cursor away from the waypoint or press **CLEAR**.

2. Press **CLEAR** to remove the place waypoint soft keys.

➤ To place a waypoint using the Waypoint List:

1. Press **MARK**, followed by the WAYPOINT LIST soft key; the Waypoint List and associated soft keys are displayed as shown in *Figure 3-22*:

Figure 3-22: Waypoint List and Soft Keys

The list details all waypoints in alpha-numeric order. The selected waypoint is indicated by the highlight bar; its position, bearing and range are shown, together with date, time and, if placed at vessel, depth and temperature (if available).

2. Press the MAKE NEW WAYPOINT soft key.

The waypoint is placed at the current vessel position, or if not available, the cursor position. It is added to the Waypoint List and named with the next available number. The unit then enters edit mode for editing the waypoint as described in *Editing Waypoint Details* on *page 3-22*.

3. To return to the default soft key display, press **CLEAR** twice.

Selecting a Waypoint

Selecting a waypoint from the Waypoint List allows you to GOTO and EDIT (symbol, name, position, erase) the waypoint. The Waypoint List also provides options to make a new waypoint and transfer waypoints.

Positioning the cursor over a waypoint selects that waypoint and accesses the waypoint soft keys. These keys enable you to go to (described in *Section 3.6*), edit (symbol, name, position), erase or move the waypoint.

➤ To select a waypoint using the Waypoint List:

1. Press **MARK**, followed by the WAYPOINT LIST soft key.

The Waypoint List and associated soft keys are displayed, see *Figure 3-22*.

2. Use the trackpad to move the selection bar through the list to highlight the required waypoint.

    The selected waypoint can be edited via the displayed soft keys.

➤ To select a waypoint using the cursor:

1. Move the cursor over the waypoint, until the letters WPT are displayed.

    The Waypoint Data box (see *Waypoint Data Display* below) and the soft keys are displayed as shown in *Figure 3-23*:

```
GOTO        EDIT        ERASE       MOVE
WAYPOINT   WAYPOINT    WAYPOINT    WAYPOINT
```
D4959_1
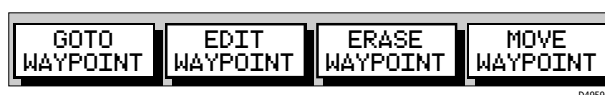
Figure 3-23: Waypoint Soft Keys

The selected waypoint can be edited via these soft keys.

Waypoint Data Display

In chartplotter mode, waypoint data can be viewed in two ways; either using the context-sensitive cursor to select the waypoint and display the pop-up Waypoint Data Box, or by viewing waypoint details from the Waypoint List.

➤ To display the waypoint details from the Waypoint List:

1. Select the waypoint from the Waypoint List as described in *Selecting a Waypoint* on *page 3-20*.

    The details for the selected waypoint are displayed. Temperature, depth, date and time are included (if available) for waypoints placed at the vessel's position.

2. To remove the Waypoint List and return to the default soft key display, press **CLEAR** twice.

➤ To display the Waypoint Data Box:

1. Move the cursor over the waypoint.
    - The Waypoint Data Box is displayed which indicates waypoint number/name, bearing and range (or latitude/longitude if selected in the system set up menu, see *Chapter 4*).
    - Whilst the cursor is over the waypoint, the waypoint soft keys are displayed, see *Figure 3-23*.

➤ To remove the Waypoint Data Box and soft keys either:

1. Move the cursor away from the waypoint, or...
2. Press **CLEAR**.

Editing Waypoint Details

You can change the name, symbol and position of any waypoint (except the target waypoint).

➤ To edit a waypoint:

1. Select the waypoint, using the cursor or the Waypoint List, as described in *Selecting a Waypoint* on *page 3-20*. The waypoint soft keys are displayed.

2. Press the EDIT WAYPOINT soft key. The Edit Waypoint soft keys are displayed:

| SYMBOL | NAME | POSITION | ERASE WPT |

D4908-1

Figure 3-24: Edit Waypoint Soft Keys

Note: *The* ERASE WPT *soft key is only available via the Waypoint List.*

3. To edit the symbol, press the SYMBOL soft key.
Use the soft keys, shown in *Figure 3-25*, to highlight the required symbol, then press **ENTER** to confirm the selection.
Press **CLEAR** to return to the default soft keys.

SELECT SYMBOL

D4909_1
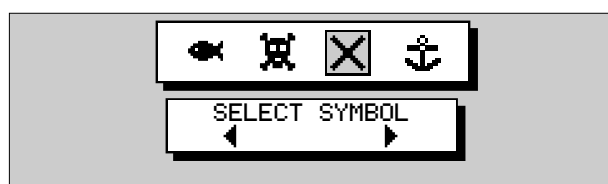
Figure 3-25: Waypoint Symbol Selection

4. To edit the waypoint name, press the NAME soft key.
The NAME WAYPOINT window is displayed.

5. Use the trackpad to enter or edit the name:
   • Use the trackpad left/right to move the cursor to the character to be changed.
   • Use the trackpad top/bottom to scroll through the characters.

6. When name editing is complete, press **ENTER** to save the name and remove the window, or **CLEAR** to cancel the operation. The waypoint name replaces the waypoint number.

7. Press **CLEAR** to return to the default soft keys.

8. To edit the waypoint position, press the EDIT WAYPOINT soft key, followed by POSITION.
The Waypoint Position pop-up box is displayed.

9. Use the soft keys or trackpad left/right to select LAT, LON, BRG or RNG.

Note: *If no fix has been acquired, the* SET BRG *and* SET RNG *soft keys are unavailable and grayed out.*

10. Use the trackpad to edit the value:
    • Use the trackpad left/right to move the cursor to the character to be changed.
    • Use the trackpad top/bottom to scroll through the characters.
    • Adjust each parameter until the waypoint position is correct.
11. When position editing is complete, press **ENTER** to save the position or **CLEAR** to cancel the operation.
    The Waypoint Position window is removed from the screen and the default soft keys are displayed.

Erasing a Waypoint

In chartplotter mode you cannot erase the target waypoint or waypoints that are used in routes. However, you can remove a waypoint from the current route - see *Editing a Route* on *page 3-34*.

If you try to erase a waypoint that is used in a saved route you are warned WAYPOINT IS USED IN A ROUTE & CANNOT BE DELETED.

➤ To delete a waypoint using the Waypoint List:

1. Select the waypoint from the Waypoint List as previously described. The Waypoint List soft keys are displayed.
2. Press the EDIT WAYPOINT soft key, followed by ERASE WPT. The way-point is removed from the screen and the Waypoint List is updated.
3. Press CLEAR three times to return to the default soft keys.

➤ To delete a waypoint using the cursor:

1. Move the cursor over the waypoint until the letters WPT are displayed. The waypoint soft keys are displayed.
2. Press the ERASE WAYPOINT soft key. The waypoint is removed from the screen and the Waypoint List is updated.

Moving a Waypoint

You can move any waypoint except the target waypoint (the waypoint you are navigating towards). You can use the Waypoint soft keys and cursor to move the selected waypoint, or you can edit the waypoint position.

CAUTION:
Take care when editing waypoints as it is possible to move waypoints that are used in routes stored in the Route List.

➤ To move a waypoint using the Waypoint Edit functions:

1. Select the waypoint using either the cursor or the Waypoint List as described in *Selecting a Waypoint* on *page 3-20*; the waypoint soft keys are displayed.

2. To edit the waypoint position, proceed as previously described in *Editing Waypoint Details* on *page 3-22*.

➤ To move a waypoint using the cursor:

1. Move the cursor over the waypoint, until the letters WPT are displayed.
    The waypoint soft keys are displayed.

2. Press MOVE WAYPOINT, the cursor changes to a four-headed arrow.

3. Move the cursor to the required waypoint position.

4. Press **ENTER** to set the position and return to normal cursor control or press **CLEAR** to cancel the operation.

3.5 Working with Routes

A route is made up of a series of waypoints (maximum 50). To make a route you place a series of waypoints and/or use existing ones.

When a route is created, it becomes the current route and is displayed on screen. The current route is maintained when you power-off. Only one route can be current and is displayed (if in the field-of-view) as solid lines connecting waypoints. If you are following the route, the current leg is shown as a dotted line and previous legs are removed from the screen (although the waypoints remain displayed). The current route (and its waypoints) is transferred via SeaTalk to a repeater chartdisplay and other instruments. You can also use the Waypoint Transfer functions to transfer the route database to a repeater display, see *Transferring Waypoints and Routes* on *page 3-40*.

When you have created a route you can use the GOTO soft keys to follow the route. In addition, the GOTO default soft key provides various options as described in *Section 3.6*.

Up to 20 routes can be saved in the route database. You can then select a route from the database list as the current route, see *Retrieve a Route from the Database* on *page 3-33*.

The current route can be edited by adding and moving waypoints. The current route is always placed at the top of the database list and named

CURRENT ROUTE, so you can edit the current route without affecting the original route in the database. When a route has been saved, options are provided to name or erase a route and to display route details.

Route information can be used to review your passage plan by adjusting the planned Speed Over Ground (SOG).

Note: *On an integrated system, it is possible for the current route to be overwritten by a route from another unit; it is advisable, therefore, to save all routes.*

This section explains how to perform the following tasks:

- Creating a new route.
- Saving the current route in the database list.
- Clearing the current route.
- Retrieving a route from the database list as the current route.
- Displaying route information, including the route leg data and way-point details. Use the waypoint details to review your passage plans for different speeds.
- Using the database list to erase and name existing routes.
- Editing a route by adding, removing and moving waypoints.

Creating a New Route

Note: *If there is a current route, it is cleared when* MAKE ROUTE *is selected. If following the current route you are prompted to* STOP FOLLOW. *Press the* YES *soft key to continue, or* NO *to abandon route creation. If the route has not been saved you are prompted to save it.*

Routes can be created by either or both:

- Using the Route Building Table to select existing waypoints; this assumes that a number of waypoints already exist.
- Placing new waypoints on the chart using the cursor.

After a route has been created, it can be edited as described in *Editing a Route* on *page 3-34*.

➤ To make a new route using the Route Building Table:

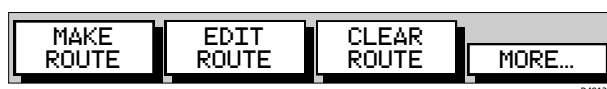1. Press the ROUTE soft key; the route soft keys are displayed as shown in *Figure 3-26*.

Figure 3-26: Route Soft Keys

2. Press the MAKE ROUTE soft key; the make route soft keys are displayed (*Figure 3-27*).

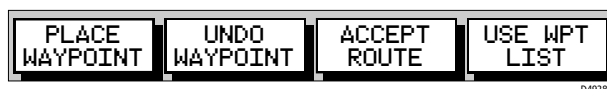| PLACE WAYPOINT | UNDO WAYPOINT | ACCEPT ROUTE | USE WPT LIST |

D4928-1

Figure 3-27: Make Route Soft Keys

3. Press the USE WPT LIST soft key; the two column Route Building Table is displayed with its associated soft keys (*Figure 3-28*).

WAYPOINTS	**NEW ROUTE**
COWES	01 HARBOUR
GURNARD LEDGE	02 MAIN CHANNEL
MAIN CHANNEL	03 COWES
NEEDLES FAIRWAY	04 LYMINGTON
PORT SOLENT	
50°50'000N 001°06'000W	50°52'230N 001°02'390W
348°m **2.30**nm	**300°**m **1.00**nm

| INSERT WAYPOINT | REMOVE WAYPOINT | ACCEPT ROUTE | USE CURSOR |

D4929-2

Figure 3-28: Route Building Table

The Route Building Table shows available Waypoints in the left hand column (alphanumeric). The right hand column contains the waypoints in the New Route. The number to the left of the waypoint name in the New Route column indicates its order in the route. The lower part of the table shows position, bearing and range of the highlighted waypoint.

4. Use the trackpad left/right to alternate between the two columns; the highlighted title indicates the selected column. Use the trackpad up/down to scroll through the lists.

5. Select a waypoint from the Waypoint List, go to the New Route column and select a position in the list.

6. Press the INSERT WAYPOINT soft key to place the waypoint below the selected position in the Route.

7. To remove a waypoint from the New Route column, highlight the waypoint and press the REMOVE WAYPOINT soft key.

Notes: (1)*A waypoint cannot be used more than once in a route; those already used are grayed out.*

   (2)*The* INSERT WAYPOINT *or* REMOVE WAYPOINT *action adds/removes the highlighted waypoint to/from the Route column, regardless of which column is selected.*

3. When all waypoints have been entered, press the ACCEPT ROUTE soft key (or **ENTER**) to complete the route.

Note: *The completed route is stored in the display unit and will be re-displayed if you turn the unit off then on again. However, on an integrated system it is possible for a current route from another unit to overwrite this route; it is therefore recommended that you Save the route, as described in Saving the Current Route on page 3-28.*

➤ To make a new route by placing waypoints using the cursor:

Note: *You can pan the display and change the scale whilst placing waypoints.*

1. Use the DISPLAY key to select Chart mode.
2. If necessary, move the cursor to the area in which you wish to make the route and select a suitable scale.
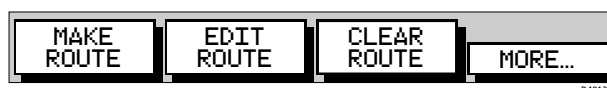3. Press the ROUTE soft key; the route soft keys are displayed as shown in *Figure 3-29.*

D4913-1

Figure 3-29: Route Soft Keys

4. Press the MAKE ROUTE soft key; the make route soft keys are displayed as shown in *Figure 3-30.*

D4928-1
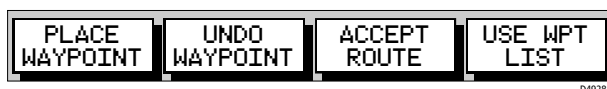
Figure 3-30: Make Route Soft Keys

5. Move the cursor to the position on the chartplotter where the first waypoint is to be placed, then press the PLACE WAYPOINT soft key; the new waypoint appears on the screen at the cursor position.

    A new waypoint is temporarily added to the Waypoint List with the first available waypoint number. The waypoints in the current route are re-numbered to identify the new positions. The number shown adjacent to the waypoint identifies its position in the route.

Note: *The cursor can be positioned on an existing waypoint - the text WPT indicates that the existing waypoint is being re-used rather than placing a new one. Press PLACE WAYPOINT to include this waypoint in the route. If you Clear the route before it is Saved, the waypoint is removed.*

6. Move the cursor to the next waypoint position. A dotted line connects the cursor to the last placed waypoint.

7. Press PLACE WAYPOINT again. The waypoint is placed and the dotted line changes to a solid line.

   If you placed the waypoint incorrectly, you can delete the last-placed waypoint by pressing the UNDO WAYPOINT soft key.

8. Repeat steps *(6)* and *(7)* until you have placed all your waypoints. Up to 50 waypoints can be included in a route.

9. To remove a waypoint move the cursor over it and press UNDO WAY-POINT.

10. When all waypoints have been entered, press the ACCEPT ROUTE soft key (or **ENTER**) to complete the route.

    The new route is displayed on the screen and becomes the current route, but it is not yet active.

➤ To use a combination of the Cursor and Route Building Table methods, alternate between them using the USE CURSOR/USE WPT LIST soft key.

The first waypoint of a new route is outlined with a square, indicating that it will be the target waypoint when the route is activated. If selected, the waypoint data box is displayed for the target waypoint.

Saving the Current Route

You can save up to 20 named routes in the Route Database List. These routes can then be re-displayed and followed at a later date. When you save the route, all new waypoints are saved in the Waypoint List.

Note: *When a change to this route is attempted, eg.* CLEAR ROUTE *and the current route has not been saved, you are prompted to save it.*

➤ To save and name the current route:

1. Press the ROUTE soft key followed by MORE to access the SAVE ROUTE soft key.

2. Press the SAVE ROUTE soft key. The Save Route List and the NAME ROUTE soft keys are displayed as shown in *Figure 3-31* with the next available entry on the Route List highlighted.
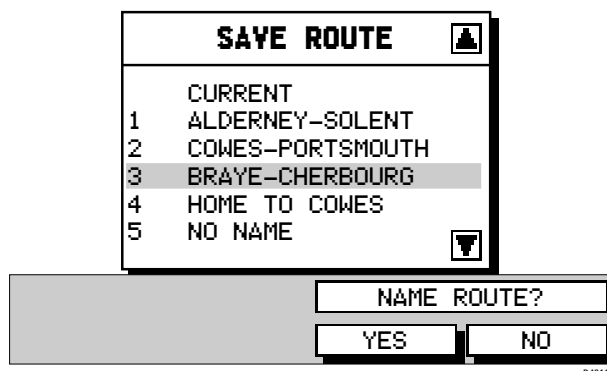
```
SAVE ROUTE  ▲

   CURRENT
1  ALDERNEY-SOLENT
2  COWES-PORTSMOUTH
3  BRAYE-CHERBOURG
4  HOME TO COWES
5  NO NAME           ▼

              NAME ROUTE?
              YES      NO
                            D4911-1
```

Figure 3-31: Save Route Soft Keys

Note: *The trackpad up/down can be used to select another position in the list; this can be an empty position or an existing route that you no longer require.*

3. If you do not wish to name or re-name the route, press the NO soft key to clear the list. The route is saved and is listed as ROUTE NOT NAMED.

4. To name the route press the YES soft key. Use the trackpad to move the cursor right or left to the character you wish to edit. Then use the top or bottom of the trackpad to increase or decrease the letter or number.

5. Press **ENTER** to finish and clear the Name List, or press **CLEAR** to cancel the operation. To return to the default soft key display, press **ENTER** again.

Displaying Route Information

The following route information can be displayed:

•   Full route details, using the soft keys.

•   Route leg or waypoint information, using the context-sensitive cursor.

Full Route Details

➤ To display information about any route in the database:

1. Press the ROUTE soft key, followed by MORE, then press ROUTE LIST. The Route List is displayed with the selected route highlighted as shown in *Figure 3-32*.
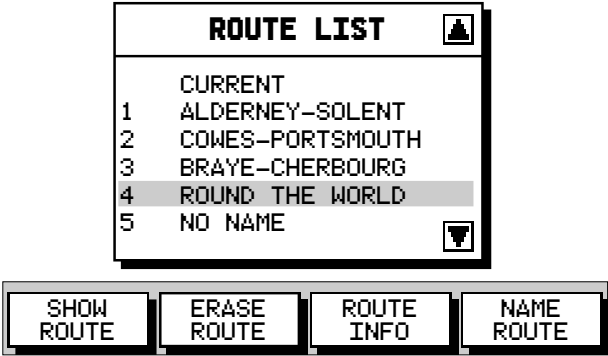
```
      ROUTE LIST      ▲

      CURRENT
   1  ALDERNEY-SOLENT
   2  COWES-PORTSMOUTH
   3  BRAYE-CHERBOURG
   4  ROUND THE WORLD
   5  NO NAME          ▼
```

```
  SHOW       ERASE      ROUTE      NAME
  ROUTE      ROUTE      INFO       ROUTE
```

D4916-1

Figure 3-32: Route List and Soft Keys

2. Use the trackpad up/down to select the required route, then press the ROUTE INFO soft key.

   The Route Information is displayed as shown in *Figure 3-33*.

```
   ROUTE INFO-CURRENT ROUTE

WPT POSITION    BRG DISTANCE TOTAL TIME
                °T    nm       nm   ETA
001  50°50!00N  ---   0.0      0.0  0:00
     001°06!00W
002  50°51!00N  239   4.8      4.8  0:20
     001°07!00W
003  50°52!00N  241   5.2     11.0  0.45
     001°08!00W
```

```
              ACTUAL
   TIME        SOG         PLANNED SOG
ETA HOURS     4.5kts       ▼xx.x Kts▲
```

D4930-1

Figure 3-33: Route Information Screen

3. Use the soft keys to toggle between ETA or HOURS (elapsed) time and to change the Speed Over Ground (SOG) value used in the time calculations. The current selections are highlighted.

➤ To change the SOG used for ETA calculations:

1. Press the PLANNED SOG soft key to switch to PLANNED SOG.
2. Press the up or down PLANNED SOG arrow soft keys to increment/decrement the planned SOG value.
   The Time values in the Route Information list are updated.
3. Press the ACTUAL SOG key to use the actual SOG value rather than a planned one.
4. Press **CLEAR** to remove the Route Information window, then **CLEAR** again to return to the route soft keys.
5. To return to the default soft key display, press **CLEAR**.

Route Leg and Waypoint Information

➤ To display information about a route leg, move the cursor over the leg until the letters RTE appear. The Route Leg data box is displayed, together with the Follow Route soft keys as shown in *Figure 3-34*.
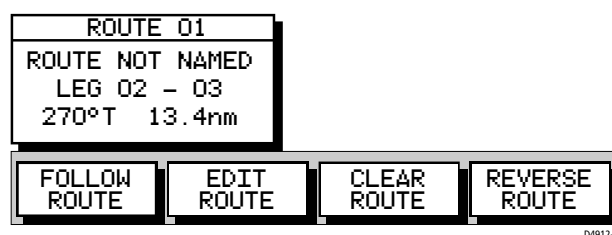
```
      ROUTE 01
ROUTE NOT NAMED
   LEG 02 - 03
  270°T  13.4nm
```

```
FOLLOW    EDIT     CLEAR   REVERSE
ROUTE     ROUTE    ROUTE    ROUTE
```
D4912-1

Figure 3-34: Route Leg Data Box and Soft Keys

Note: *If a route is being followed, the* FOLLOW ROUTE *soft key changes to* STOP FOLLOW.

To remove the data box, move the cursor away from the route or press **CLEAR**.

➤ To display information about a route waypoint, move the cursor over the waypoint until the letters WPT appear. The Waypoint Data Box is displayed. together with the Follow Route soft keys as shown in *Figure 3-35*.

```
      WPT 017
     60°08:21N
     030°17:99W
    RTE 01 WPT 02
```

```
FOLLOW      EDIT     REMOVE     MOVE
FROM HERE  WAYPOINT WAYPOINT  WAYPOINT
```
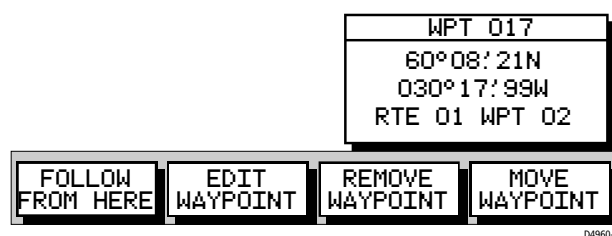D4960-1

Figure 3-35: Waypoint Data Box and Soft Keys

The Waypoint can be edited by means of the associated soft keys, see *Editing Waypoint Details*.

To remove the data box, move the cursor away from the waypoint or press **CLEAR**.

Clearing the Current Route from the Screen

If the current route has not been saved, you have the option of saving it; if you are following the current route, you have the option to stop.

➤ To clear the current route, either:

1. Place the cursor over a route leg until the text RTE is displayed.
    The Route soft keys are displayed as shown in *Figure 3-34*.
    Press the CLEAR ROUTE soft key to clear the route.

or...

2. Press the ROUTE default soft key.
    The Route soft keys is displayed as shown in *Figure 3-29*:
    Press the CLEAR ROUTE soft key to clear the route.

or...

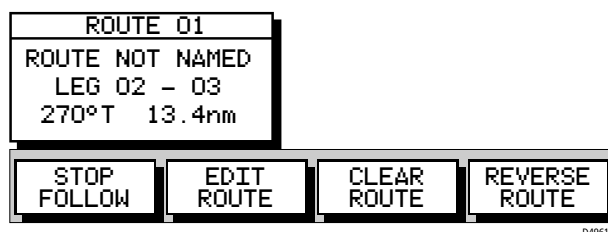3. If following the current route, the STOP FOLLOW soft keys are displayed as shown in *Figure 3-36*.

```
      ROUTE 01
 ROUTE NOT NAMED
   LEG 02 - 03
   270°T  13.4nm
```

| STOP | EDIT | CLEAR | REVERSE |
| FOLLOW | ROUTE | ROUTE | ROUTE |

D4961-1

Figure 3-36: Stop Follow Soft Keys

4. If the route has not been saved the SAVE ROUTE soft keys are displayed as shown in *Figure 3-37*.

```
                        SAVE ROUTE?
                     YES       NO
```
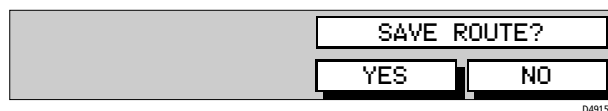
D4915-1

Figure 3-37: Save Route Soft Keys

   i. To save the route in the database, press YES.
   ii. To clear the route, without saving it in the route database, press NO.

5. Continue as described previously in *Saving the Current Route*.

The current route is cleared from the screen and the default soft keys are displayed. You can now use the ROUTE soft keys to make a route, or to show another route from the database.

Retrieve a Route from the Database

A route can be selected from the Route List for use as the current route. The Route List is accessed from the second set of ROUTE soft keys.

➤ To select a route as the current route:

1. From chartplotter mode, press the ROUTE soft key, followed by MORE, then ROUTE LIST. The Route List is displayed with the selected route highlighted, see *Figure 3-32*.

Note: *In any mode other than chartplotter mode, the* ROUTE LIST *soft key is available without pressing the* MORE... *soft key.*

2. Use the trackpad up/down to select the required route then press the SHOW ROUTE soft key. The Route List is removed and the selected route is shown on screen as the current route. If the current route has not been saved, you are prompted to do so.

Using the Route List to Erase or Name a Route

The Route List can be used to delete a route or re-name a route.

➤ To delete or re-name a route in the Route List:

1. Press the ROUTE soft key, followed by MORE, then press ROUTE LIST. The Route List is displayed. The selected route is highlighted, see *Figure 3-32*.

Note: *In any mode other than chartplotter mode, the* ROUTE LIST *soft key is available without pressing the* MORE... *soft key.*

2. Use the trackpad up/down to select the required route and press the appropriate soft key - ERASE ROUTE or NAME ROUTE.

3. If you ERASE a route you are prompted to confirm.
    i. Press NO to cancel the operation, then **CLEAR** if you wish to remove the Route List or...
    ii. Press YES to erase the route from the list, then **CLEAR** to remove the Route List.

4. To NAME a route, use the trackpad left/right to select the character you wish to edit. Use the trackpad top/bottom to change the character.

5. Press **ENTER** to confirm the new name and return to the Route List or **CLEAR** to cancel the operation.

6. Press **CLEAR** twice to return to the default soft key display.

Editing a Route

After a route has been created, it can be edited by:

- Inserting a Waypoint into the route
- Adding waypoints at the end of the route
- Removing a Waypoint
- Reversing a Route
- Moving a Waypoint as described in *Section 3.4.*

Note: *Apart from Moving a Waypoint used in other route(s), any changes made to the route affect the current route only. The current route must always be Saved in order to keep the changes.*

Inserting a Waypoint into a Route

The context-sensitive cursor can be used to insert one or more waypoints into the current route. However, if the route is being followed, a waypoint cannot be inserted into the current leg.

➤ To insert a new waypoint into the current route:

1. Move the cursor over the route leg into which a waypoint is to be inserted; the letters RTE appear and the Route Leg Data Box and Route soft keys are displayed, see *Figure 3-34*.

2. Press **ENTER**; the cursor changes to a four-way arrow, controlling a new waypoint. The waypoint is connected to the existing waypoints on either side with a dashed line.

3. Move the new waypoint to the required position and press **ENTER** to place it and return to normal cursor operation, or **CLEAR** to abandon the operation.

The new waypoint is temporarily added to the Waypoint List and named with the first available waypoint number. The waypoints in the current route are re-numbered to identify the new positions.

Note: *If you clear the route without saving it, the new waypoint is removed.*

Adding/Removing Waypoints at the End of the Route

Waypoints can be added or removed by either using the Waypoint List, see *Placing a Waypoint* on *page 3-19*, or as described below.

➤ To add waypoints to the end of the route:

1. Press the ROUTE soft key, followed by the EDIT ROUTE soft key.
   The Make Route soft keys are displayed (*Figure 3-30*) and the cursor is connected to the last-placed waypoint with a dotted line. Further

waypoints can be added to the route in the same way as for a new route.

2. Move the cursor to the required location, and press PLACE WAYPOINT soft key.

3. Place as many waypoints as required and press the ACCEPT ROUTE soft key; the default soft keys are displayed.

Note: *If you have placed waypoint(s) incorrectly, press the* UNDO WAY-POINT *soft key. Repeat to remove successive waypoints from the route, including existing waypoints.*

Removing a Waypoint from within the Route

➤ To remove a waypoint from within the current route:

1. Move the cursor over the required waypoint until the letters WPT appear; the waypoint soft keys are displayed.

2. Press the REMOVE WAYPOINT soft key. The waypoint is removed from the route and the route is re-numbered.

Note: *You can remove the last waypoint from a route, as described in Adding/Removing Waypoints at the End of the Route above.*

• If the route has not been saved, the waypoint is erased.

• If the route has been saved, the waypoint remains on the screen, but is no longer in the route.

Reversing the Route

This option enables a return route to be generated from an existing route which is then followed in reverse order, with waypoints renumbered accordingly.

➤ To reverse the current route either:

1. Press the ROUTE soft key followed by MORE.
    i. Press REVERSE ROUTE.
    ii. Press **CLEAR** to return to the default soft key display.

or...

2. Move the cursor over a route leg until the letters RTE appear; the route soft keys are displayed.
    i. Press the REVERSE ROUTE soft key; the current route is reversed on the screen and the waypoints are renumbered accordingly.
    ii. Press **CLEAR** to return to the default soft key display.

3.6 Following Routes and Going to Waypoints

The default GOTO soft key accesses the functions to follow a route and Goto a waypoint or cursor. When a target destination is selected, the Chartplotter calculates bearing, distance and cross track error (XTE). This information can be shown on screen and is sent on SeaTalk and NMEA for use by an Autopilot or display on a compatible SeaTalk or NMEA repeater. You can also restart the XTE from the vessel's position and set XTE to zero at that point.

When the Chartplotter is following a route, the target destination is indicated by a square around the waypoint and a dotted line shows the intended track, from your start point or previous waypoint, to the target waypoint.

This section describes the following:

- Go to an individual target point (an existing waypoint or the cursor).
- Follow a route either forward, or reversed.
- Joining a route at a selected waypoint, advancing to waypoints or restarting XTE.
- Stop and Restart Follow/Goto.
- Target Point Arrival

An alarm is triggered when approaching a waypoint. This section describes what occurs when arriving at waypoints. *Chapter 4* describes how to set the alarm.

The Chartplotter can also display the vessel's actual track which can be recorded for later display. The Track function is described in *Section 3.8, Using Tracks*.

➤ To access the Goto/Follow soft keys, press the GOTO default soft key; the GOTO soft keys are displayed as shown in *Figure 3-38*.

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Figure 3-38: GoTo Soft Keys

Note: *The soft keys differ if a follow or goto is already in progress.*

Going To an Individual Target Point

Rather than following a route, you can go directly to a selected target point. This can be an existing waypoint (not in the current route) or the cursor position.

➤ To navigate directly to an existing waypoint:

1. Select the waypoint from the Waypoint List as described in
   Section 3.4.

2. Press the GOTO WAYPOINT soft key.
   Navigation to the selected waypoint begins. The soft key STOP GOTO
   is displayed.

3. To return to the default soft key display, move the cursor away from
   the waypoint.

➤ To navigate directly to the cursor position:

1. Use the trackpad to position the cursor as required.

2. Press the GOTO default soft key, followed by GOTO CURSOR.
   If navigation is currently in progress you are warned ALREADY FOL-
   LOWING ROUTE. CANCEL ROUTE AND GOTO CURSOR?

   i.   To cancel the GOTO CURSOR operation, press NO.

   ii. To continue with the GOTO CURSOR operation (and stop the
        current GOTO ROUTE), press YES.

   A temporary waypoint is placed as the target and navigation starts
   towards it. The waypoint is shown as a square with a circle and dot at
   its centre and is connected to the vessel's starting position with a
   dashed line.

   The STOP GOTO soft key is displayed.

   Note: *The temporary waypoint is not added to the Waypoint List. When
   the* GOTO *is complete or is stopped, the temporary waypoint remains on
   the chartplotter screen until either another Goto or Follow is started or it
   is removed.*

3. To return to the default soft key display, move the cursor away from
   the waypoint or press **CLEAR**.

or...

• Using the trackpad, position the cursor over the required waypoint
  until the letters WPT and the waypoint soft keys are displayed as
  shown in *Figure 3-23*.

Follow a Route

Note: *The current route may have been created on this display unit, or
created on another unit and received on this display via SeaTalk. If a
route has been reversed, or if a route on screen was being followed but
stopped before completion, the target waypoint, outlined by a square
box, may be different to that when the route was created. **Always check
the target waypoint before initiating a Follow Route action.***

➤ To follow the current route, either:

- Press the GOTO default soft key to display the Goto/Follow soft keys (*Figure 3-38*) and press the FOLLOW ROUTE soft key

or...

- Place the cursor over a route leg until the letters RTE and the route soft keys are displayed and press FOLLOW ROUTE.

Your vessel's current position becomes the origin and the target waypoint in the current route becomes the active target; the soft keys are displayed as shown in *Figure 3-39*.

STOP FOLLOW	GOTO CURSOR	RESTART XTE	WAYPOINT ADVANCE

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Figure 3-39: Follow Route Soft Keys

➤ To follow the current route in reverse using the soft keys:

1. Reverse the route as described in *Reversing the Route* on *page 3-35* above.
2. Press the GOTO default soft key; the Goto/Follow soft keys are displayed.
3. Press the FOLLOW ROUTE soft key.

➤ To follow the current route in reverse using the cursor:

1. Place the cursor over the route leg until the letters RTE and the route soft keys are displayed.
2. Press REVERSE ROUTE then FOLLOW ROUTE.

Other Follow Route Options

You can use the soft keys to follow a route from a selected waypoint (Join a route), or if already following, you can advance to the next waypoint. You can also restart the cross track error (XTE), setting the current vessel position as the new origin.

In addition, you can move a selected waypoint as described in *Section 3.4*, or remove a waypoint from the route as described in *Section 3.5*.

Note: *You cannot remove a waypoint from a route if it is the target.*

Joining a Route

➤ To start following the current route at a selected waypoint:

1. Move the cursor over the required route waypoint until the letters WPT and the waypoint soft keys are displayed.
2. Press the FOLLOW FROM HERE soft key.

   Your vessel follows the route, using the selected waypoint as the target point.
3. To return to the default display, move the cursor away from the waypoint or press **CLEAR**.

Advancing to a Waypoint

When you are following a route, you can advance to the next waypoint, even if you have not reached the current target waypoint:

➤ To advance to a waypoint:

1. Press the GOTO default soft key to display the Goto/Follow soft keys.
2. Press the WAYPOINT ADVANCE soft key. The current leg of the route is abandoned and the next waypoint becomes the target. The display is updated to show the new route leg.

Note: *You can advance past the end of a route back to the start.*

Restart Cross Track Error (XTE)

Whilst following a route or going to a target point, you can restart the XTE. This sets the XTE to zero and moves the origin to the actual vessel position.

Restarting XTE is useful if you find the vessel off track and prefer to go straight to your target, rather than going back to the original track.

➤ To restart XTE:

1. Press the GOTO default soft key, the Follow/Goto soft keys are displayed.
2. Press the RESTART XTE soft key. The route origin moves to the vessel's current position, resetting the XTE to zero.

Stop Follow or Stop Goto

➤ To stop following the route or target point either:

• If necessary, press the GOTO soft key, then press the STOP GOTO/FOL-LOW soft key

or...

- Move the cursor over any waypoint or leg in the current route, then press the STOP GOTO/FOLLOW soft key.

  The dotted line from your vessel to the target waypoint disappears.

If you subsequently use the FOLLOW ROUTE soft key to restart navigation, the route is followed from the point at which it was stopped. This is indicated by a square around the target waypoint. If you want to follow from another waypoint you can initiate the follow then use the WAYPOINT ADVANCE or FOLLOW FROM HERE soft key to step through the route.

Target Point Arrival

You can set up target alarms (see *Section 3.10*) to alert you when the vessel is approaching the target point. The arrival alarm is defined as an invisible circle, with a specified radius, around the target.

The alarm is triggered when either of the following conditions is met:

- The distance to the target point is less than that specified for the Arrival alarm.
- Your vessel reaches the closest point of approach to the target (defined by an imaginary circle around the waypoint).

➤ To cancel the Arrival alarm and go towards the next waypoint in the route, either:

- Press any key

or...

- Wait for 10 seconds.

If another leg exists, the target becomes the origin, the next waypoint becomes the target point and the two are connected by a dotted line indicating the current leg. This does not occur for a single point Goto. Any previous route leg is removed from the screen, but waypoints remain.

Note: *When following a route using a SeaTalk autopilot, the autopilot will not turn to the new waypoint until it is accepted at the autopilot control unit.*

3.7 Transferring Waypoints and Routes

Displayed SeaTalk Waypoints

In an integrated system, when a route is made current on any SeaTalk equipment it is sent to all other SeaTalk equipment. This route will override any other current route. When GOTO waypoint or GOTO cursor is in operation it is considered a route.

The current route can be edited on any equipment with route edit capability.

Note: *Waypoints transferred as part of a route are not automatically saved by the unit; however you can save the route locally, thus adding the waypoints to the local Waypoint List.*

Managing Database Lists

Database lists can be maintained by various means. The method you choose will depend on the links available (SeaTalk or NMEA) and whether you want to transfer individual waypoints or the complete Waypoint and Route List:

• You can receive waypoints that are transmitted by other equipment on SeaTalk or NMEA.
 When this option is selected, any waypoints received on SeaTalk or NMEA are transferred and appended, one-by-one, to the Waypoint List. Routes received on NMEA are appended to the Route List. You can use this function to add waypoints from a PC connected via NMEA.

• You can send the Waypoint **and** Route Lists from the display unit to other instruments via NMEA using the SEND WPT LIST function. Sending the Waypoint List does not affect **current** routes. The NMEA link could be to a PC.

➤ To receive incoming waypoints on SeaTalk or NMEA:

1. Display the Waypoint List by pressing **MARK** followed by the WAY-POINT LIST soft key.
 Press the WAYPOINT TRANSFER soft key.

2. Press the soft key RECEIVE WPTS FROM ST/NMEA; the soft key changes to STOP RECEIVING WAYPOINTS.
 When waypoints are transmitted by other equipment they are added to the Waypoint List on the display unit. Routes transmitted on NMEA are appended to the Route List.

3. To disable waypoint transfer, press the soft key STOP RECEIVING WAY-POINTS.
 Alternatively, press **CLEAR** twice to close the Waypoint List.

Note: *Where multiple waypoints have the same position, the last waypoint sent is the only one included in the Waypoint List.*

➤ To send the Waypoint List on NMEA:

1. Display the Waypoint List as previously described, then press the WAYPOINT TRANSFER soft key.

2. Press the SEND WPT LIST ON NMEA soft key; the soft key changes to STOP SENDING WAYPOINTS.

   The Waypoint and Route Lists are transmitted from the display unit to other equipment on NMEA.

➤ To save to or load from a C-MAP memory cartridge, refer to *Chapter 4*.

3.8 Using Tracks

The Track function is used to mark, on-screen, the trail that your vessel has followed, as if it had left a visible fixed wake.

While Track is on, it is recorded in memory as the Current Track which is retained following a POWER OFF/ON. You specify the interval at which track points are created and a line is drawn on-screen between each point. The current track remains on-screen until you clear the track.

Using the *SmartRoute* function, a track can also be converted to and saved as a route which is automatically reversed, ready for use as your return voyage, see *SmartRoute* on *page 3-45*.

A total of 4500 track points can be saved, in up to five track files (each containing a maximum of 750 points).

The Current Track can be saved, named and retrieved for display at a later date. For example, you may wish to display a previous track and place waypoints along it that you can follow. You can only display one track at a time; you must clear a current track from the screen if you want to display a saved track.

This section describes how to:

• Set up a track and specify the interval.
• Clear the Current Track.
• Manage tracks using the Track List, including Saving, Naming, Erasing and Showing a track.
• Convert the current track to a route.

Setting Up a Track

The track soft keys are used to switch the Track on and to specify the interval at which track points are placed. The time interval between track points can be set to 1s, 5s, 10s, 30s, 1min, 3min, 5min, 10min or 30minutes. The distance spacing between track points can be set to 0.1nm, 0.5nm or 1.0nm. The maximum track length is 750 points per

track. When this limit is reached, track points continue to be placed, but the oldest points start to be removed. Track points continue to be placed until TRACK OFF is selected. When the unit is powered off, the current track (thus far) is retained in memory.

Setting a short time interval between track points is best suited to navigation within a close or complex environment, eg. an estuary or marina whereas, in contrast, a greater distance interval is best suited to a long haul voyage.

Refer to the setting guide shown in *Figure 3-40* to determine the best setting for your planned voyage; this is particularly important if you wish to use *SmartRoute* to convert your track to a route.
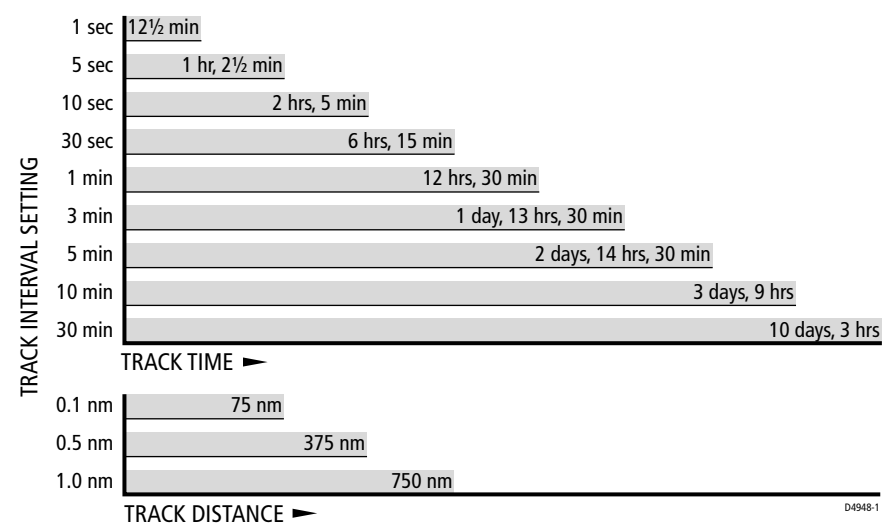
Figure 3-40: Track Interval Setting Guide

You can change the setting at any time. The setting applies only to the current track and is not saved as a stored track.

Note: *Track points are not 'wasted' when the vessel is stationary as there is a minimum distance separation, even when using a time interval setting.*

➤ To set up a track:

1. From the chartplotter display, press the **MENU** key to display the set up soft keys as shown in *Figure 3-41*.

| SYSTEM SET UP… | CHART SET UP… | TRACK SET UP… | GPS SET UP… |

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Figure 3-41: Set Up Soft Keys

2. Press the TRACK SETUP soft key to display the first level Track soft keys as shown in *Figure 3-42*:

| TRACK OFF ON | CLEAR TRACK | MAKE INTO ROUTE | MORE… |

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Figure 3-42: First Level Track Soft Keys

3. Press the MORE... soft key to display the second level Track soft keys as shown in *Figure 3-43*.

| TRACK INTERVAL ▼ 1S ▲ | TRACK LIST | MORE… |

D4920-1
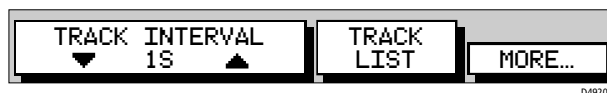
Figure 3-43: Second Level Track Soft Keys

4. Press the appropriate TRACK INTERVAL up/down soft key to set an appropriate TIME or DISTANCE interval.

5. Press **MORE** to return to the first level Track soft keys.

6. Press the TRACK OFF ON soft key to toggle tracks on/off.
    Your vessel's trail will be displayed on-screen, with a line joining the points at the selected interval.

7. To return to the default soft key display, press **CLEAR**.

Clearing the Current Track

You can clear the current track from the screen. When you select CLEAR TRACK, if the current track has not been saved, you have the option of saving it.

➤ To clear the current track:

1. Press the CLEAR TRACK soft key.

2. If the track has not been saved, the SAVE TRACK soft keys are displayed.
    i.   To clear the track without saving it in the Track List, press NO.
    ii. To save the track in the list, press YES.
    The NAME TRACK soft keys are displayed and you should continue as described in *Saving and Naming the Current Track* below.

The current track is cleared from the screen.

3. To return to the default soft key display, press **CLEAR**.

SmartRoute

SmartRoute enables the current track to be converted to a route.

➤ To convert the current track into a route:

1. Select MAKE INTO ROUTE and press **ENTER**.

   The current track is converted to a new route, with the most recently placed track point as the start of the route, ie. the track is reversed.

   If there is an unsaved current route on screen, the option to save the route is given, see *Section 3.5, Working with Routes*.

2. Check the calculated route and, in particular, that the route deviation from the original, given in the warning box, is within navigable limits.

Managing Tracks

It is a staightforward task to set up a Current Track which is retained even if you switch off your display unit. In addition, up to five different tracks can be saved so that you can use them at a later date. This section explains how to perform the following tasks:

- Save and name the Current Track.
- Name, Erase and Show a previously saved track.

Saving and Naming the Current Track

Up to five named tracks can be held in the Track List. These tracks can be retrieved at a later date.

➤ To save and name the current track:

1. Press the TRACK LIST soft key. The track list pop-up and associated soft keys are displayed.

2. The next available entry on the track list is highlighted. If required, use the trackpad to select an alternative position in the list; this can be a blank slot, or an existing track that you no longer require.

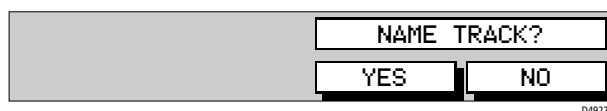3. Press SAVE TRACK. The Name Track soft keys are displayed as shown in *Figure 3-44*.

Figure 3-44: Name Track Soft Keys

4. To name the route press the YES soft key.
    i.   Use the trackpad left/right to select the character you wish to
         edit and the trackpad top/bottom to change the character.
    ii. Press **ENTER** to finish and clear the Track List.
5. To save the unnamed track, press the NO soft key to clear the list. The
    track is saved and is listed as TRACK NOT NAMED.
6. Press **ENTER** to finish and clear the Track List.
7. To return to the Track soft key display, press **CLEAR**.
8.   To return to the default soft key display, press **CLEAR** again.

Naming, Erasing and Showing a Track

➤ To name an existing track, erase a track or show a track:

1. Press the TRACK LIST soft key; the Track List is displayed.
    The highlight indicates the selected track.
2. Using the trackpad left/right, select the required track and press the
    SAVE TRACK, NAME TRACK or ERASE TRACK soft key.
3. To NAME a track, use the trackpad left/right to select the character you
    wish to edit and the trackpad top/bottom to change the character.
4. Press **ENTER** finish the operation or **CLEAR** to cancel the name.
5. To ERASE a track you are prompted to confirm:
    i.   Press NO to cancel the operation, then **ENTER** if you wish to
         remove the Track List.
    ii. Press YES to erase the track from the Track List, then **ENTER**
         to remove the Track List.
6. If you SHOW a track when a current track is displayed, you are
    prompted to save the current track. Proceed as described in *Clearing
    the Current Track* on *page 3-44* or press the NO soft key to cancel the
    operation.
    The Track List is removed and the selected track is displayed.

3.9 Man Overboard (MOB)

If a person or object is lost overboard, use the Man Overboard (MOB)
function to return to the location immediately.

Note: *To obtain an MOB position, you need either of the following:*

•   Position data from the GPS antenna.
•   Heading and speed data, so that the position can be calculated.

Select the type of data used for the MOB position by means of the Set Up
Menus (see *Chapter 4*).

➤ To initiate the MOB procedure, press and hold the **MARK** key for two seconds.

The display unit performs the following tasks automatically and the chartplotter screen is updated accordingly:

• Switches the range scale to ¼ nm.

 The MOB waypoint symbol replaces any current active waypoint and route.

• Displays the MOB data box, showing the bearing and distance from your vessel to the MOB waypoint position and the elapsed time since the MOB was initiated.

• As your vessel moves away from the MOB position, a dotted line is displayed connecting the MOB position and the vessel's current position.
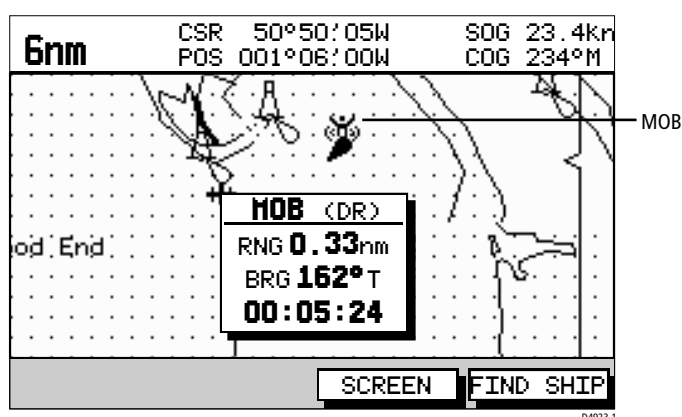
Figure 3-45: MOB Display

• Sounds a 4-second alarm pattern every 30 seconds.

• Sends an MOB message to other units in the system, via the SeaTalk connection.

• Replaces all current waypoint data with MOB data.

➤ To cancel the MOB, press and hold the **MARK** key for 2 seconds.

Note: *The MOB procedure can also be initiated or cancelled remotely if the appropriate SeaTalk message is received.*

3.10 Alarms & Timers

The Chartplotter reports the following alarms which are set using the **ALARMS** key as detailed in *Table 3-1*.

Table 3-1: Alarm and Timer Definitions

Alarm	Indicates
Arrival	Your vessel has arrived at the active waypoint: it has either reached the arrival circle (the radius of which is specified) or, has reached its closest point of approach (defined by an imaginary circle around the waypoint.
Off Track	Your vessel has exceeded the specified distance (maximum cross track error) from the active route leg.
Anchor	Your vessel has drifted from its anchor position (set when the alarm was turned on) by more than the specified distance.
Countdown	The countdown timer has reached zero.
Alarm Clock	The time matches the specified alarm time.

Use the **ALARMS** key menu to set alarms on or off and set their limits.

When an alarm is triggered, the alarm buzzer sounds and a pop-up window describing the alarm is displayed.

➤ To silence the alarm and clear the message, press any key.

If the alarm was generated by the Chartplotter, the appropriate action is taken. For example, following an arrival alarm, the next route leg is activated.

External Alarms

All SeaTalk system alarms (except autopilot alarms) are received and displayed on the Chartplotter. You can silence these alarms by pressing any key; no other action is taken by the Chartplotter except to silence the alarm.

Setting Alarms and Timers

➤ To set up an alarm or timer:

1. Press the **ALARMS** key. The Alarms Set Up list is displayed, showing the current settings as shown in *Figure 3-46*.

```
        ALARMS SET UP

ARRIVAL ALARM          0.01nm
OFF TRACK ALARM        ON
ANCHOR ALARM           OFF
COUNTDOWN              00:10:00
ALARM CLOCK            OFF


  ALARM        SELECT DISTANCE
 OFF ON           ▼        ▲
```

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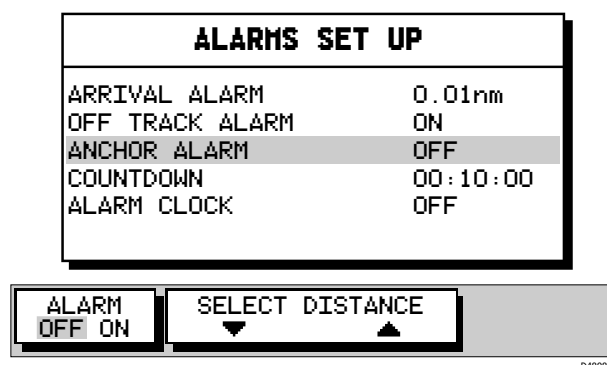
Figure 3-46: Alarms Set Up Menu

2. Use the trackpad up/down to navigate through the list. As each line is highlighted, the soft keys are updated to show the current settings and controls, as shown in *Figure 3-46*.

3. Use the up/down arrow soft keys to change the alarm value. For example, in the case of the arrival alarm, adjust the radius around the waypoint at which you require the arrival alarm to be triggered.

4. Alarm distances are set in the range 0.01nm to 9.99nm, in steps of 0.01nm. The timer is set in minutes and seconds. The alarm clock is set in hours and minutes.

5. If required, press the ALARM OFF ON soft key to toggle the alarm on or off. If you turn an alarm off, its value is retained and will be used when you turn the alarm on again.

Note: *All alarms and timers can be switched on and off, except for the Arrival Alarm which is always on.*

6. Press **ENTER** to save the changes and clear the menu.

3.11 Cursor Echo

In a chart display, or in a system with any chartplotter display connected via Seatalk, you can set the display to enable cursor transfer. Cursor echo is accessed from the Set Up Menu and enables the display of a chart cursor on another equipment, or another equipment's cursor on the chart display. Refer to *Chapter 4* to set up cursor echo.

Note: *Waypoints placed at the cursor are placed at the local cursor position. The following options are provided:*

- **Remote Radar, Plotter or Chart Cursor (SeaTalk)**: displays the cursor from a radar, plotter or chart display connected via SeaTalk.
- **Cursor Out**: outputs the display's cursor onto the SeaTalk bus.

When the appropriate option is switched on, the display shows both its own cursor and that of the other display. The other display's cursor has the letters RDR or CHT appended to it, indicating its origin. This means that you could move the cursor over a target on your Pathfinder radar display and check the identity of the target by looking at the radar cursor position on the chartplotter.

Chapter 4: Setting Up the Chartplotter

4.1 Introduction

When you have installed your system and are familiar with its basic operation, you may wish to set it up to operate according to your requirements and display information according to your preferences.

This is achieved using the Set Up controls which are displayed when you press the **MENU** key. These settings can be changed at any time.

When you have set your preferences, they are retained until you reset them; they are retained even when the unit is powered off.

This chapter provides instructions for displaying and changing the factory default values to your preferences.

The set up parameters are divided into four sections:

• **System**, controlling overall functionality.
• Chart, controlling the chartplotting functions, including waypoint information and vectors.
• **Track**, detailed in *Chapter 3:Operation*.
• **GPS**, displaying the associated GPS receiver status and setting up the Satellite Differential GPS (SDGPS) or Differential GPS (DGPS).

The following sections list the parameters, their possible settings and describe the function of each parameter in turn.

4.2 Changing the Set Up Parameters

➤ To set the default parameters:

1. Press the **MENU** key to display the Set Up soft keys shown in *Figure 4-1*; the options available depend upon the current operating mode.

Figure 4-1: Set Up Soft Keys

2. Press the soft key corresponding to the Set Up you require.
   The requested Set Up menu is displayed, listing the parameters and their current settings.

3. Use the trackpad up/down to move the highlight through the list. Arrows are displayed at the top/bottom right-hand corner if you can scroll the list to display further parameters.

As each line is highlighted, the soft keys are updated to show the settings available.

- For parameters that have a numeric value, or more than four possible settings, a scroll list is displayed above two of the soft keys.
- Some parameters are controlled by a slider that is displayed above two of the soft keys.
- For some parameters, a soft key provides access to a sub-menu of further options.

4. Press the soft key corresponding to the desired setting or, for scroll lists, use the soft keys to scroll forwards or backwards through the list until the required setting is highlighted. This setting is retained when you move the selection bar on to the next parameter in the menu list.

5. When all the required values have been set, press **ENTER** to implement the changes and return to the set up soft keys.

6. Press **CLEAR** to clear the soft keys and return to the default display.

You can return all the settings to their original factory settings, if required, by performing a reset as described in *Chapter 6*.

4.3 System Set Up Parameters

The System menus and their options are listed in *Table 4-1*. It also shows the factory default setting and provides a space to make a note of the new default setting. Each parameter is described in the following subsections.

Table 4-1: System Set Up Parameters

Menu	Options	Factory Default	New Default
BEARING MODE	Magnetic True	TRUE	
CURSOR DIS-PLAY	MAG/TRUE RELATIVE	RELATIVE	
CURSOR READOUT	OFF LAT/LONG RNG/BRG BOTH	RNG/BRG	
DAY/NIGHT	DAY/NIGHT	DAY	
HELP	OFF/ON	ON	
SOFT KEYS	OFF/ON	ON	
KEY BEEP	OFF/ON	ON	

Table 4-1: System Set Up Parameters (Continued)

Menu	Options	Factory Default	New Default
MOB DATA	DR POSITION	DR	
MENU TIME-OUT PERIOD	NO TIMEOUT 10, 20, 30 SECONDS	NO TIMEOUT	
DISTANCE UNITS	Nautical miles Statute miles Kilometres Kiloyards	Nautical miles	
Speed Units	KnotS Miles per hour Kilometres per hour	KnotS	
Depth Units	Metres Feet Fathoms	Metres	
TEMPERA-TURE Units	CENTIGRADE FAHRENHEIT	CENTIGRADE	
VARIATION SOURCE	AUTO MANUAL	AUTO	
CURSOR ECHO			
LOCAL CUR-SOR	OFF or ON	ON	
REMOTE CUR-SOR	OFF or ON	OFF	
DATE FORMAT	DD/MM/YY MM/DD/YY	DD/MM/YY	
TIME FORMAT	12 HOUR 24 HOUR	24 HOUR	
Time Offset	UTC, or local offset value: Plus or minus up to 12 hours, in whole hours	UTC	
GPS SOURCE	Master/Repeater	MASTER	
NMEA INPUT	NMEA/RTCM	NMEA	

Table 4-1: System Set Up Parameters (Continued)

Menu	Options	Factory Default	New Default
LANGUAGE	English (UK), English (US), Danish, French, German, Dutch, Italian, Norwegian, Portuguese, Spanish, Swedish, Finnish	English (UK)	
SIMULATOR	OFF DATA ON	OFF	

Bearing Mode

This is the mode (magnetic or true) of all the bearing and heading data displayed as indicated in the status bar.

Cursor Reference

The mode of the bearing data displayed for the cursor readout. The bearing information can be displayed in either of two forms:

- **Relative:** The bearing relative to your vessel's heading.
- **Mag/True:** The actual bearing in either degrees magnetic or degrees true. This option is only available if you have heading data from a compass.

    If you choose this mode, the selection you made for the previous parameter (Bearing Mode), °M or °T, is displayed in the cursor (RNG/BRG) data boxes. The current units are shown for the heading value in the status bar.

Cursor Readout

This option controls whether the cursor data is shown in latitude and longitude or in range and bearing. Alternatively, you can show both types of readout, in separate boxes, or turn the cursor data box off.

You can also turn the cursor readout box(es) on and off during normal operation, via the SCREEN default soft key (see *Chapter 2*).

Day/Night

This option allows you to change the target presentation between DAY and NIGHT modes.

In normal day presentation, black targets are displayed on a white background. If NIGHT presentation is selected, the image is reversed, so that white targets are shown on a black background to reduce the intensity of the image.

Help

When Help is set to ON, a prompt appears in place of the status bar when selecting a soft key or menu choice and when using the context-sensitive cursor. The help message is cleared when an action is selected.

Soft Keys

When the Soft Keys option is set to ON, the default soft keys are displayed if no other operation is in progress.

When the Soft Keys option is set to OFF, the default soft keys are only displayed when a soft key is pressed and they disappear if no operation is performed for 10 seconds.

Key Beep

This option controls whether or not the keys sound when pressed.

Note: *The alarms continue to sound.*

MOB Data

This option controls whether MOB data is based on GPS data, or on dead reckoning (DR). Dead reckoning normally provides a better indication of the course to an object in the water, on the assumption that your vessel and the object are both subject to the same tide and wind effects.

Menu Timeout Period

With no time-out set, menus and soft key labels remain displayed until you clear them by pressing **ENTER**, **CLEAR** or the appropriate dedicated key.

Units

You can set the units for speed, depth and temperature. The units set will be used to display all data, including information received from other instruments on the system. However, the distance units do not affect the instrumented range of the display, which is always in nautical miles.

Variation Source

The variation value is the difference between True and Magnetic direction data for heading or bearing values. The Variation Source option

provides soft keys for selecting Auto or Manual variation mode, displays
the current variation value for each and highlights the currently selected
mode.

Auto Mode

If Auto mode is selected, the value of variation is obtained automatically,
normally from received data. The variation value that is used depends on
the data available, and is selected in the following order of priority:

1. Variation value from the same source as the heading data:

     If heading data is being taken from NMEA, then variation is also
     taken from NMEA

     If heading is taken from SeaTalk, then SeaTalk variation is used.

2. Variation value from a different source:

     If heading data is being taken from NMEA, but no NMEA varia-
     tion is available, then variation is taken from SeaTalk.

     If heading is taken from SeaTalk, but no SeaTalk variation is
     available, then variation is taken from NMEA.

3. A calculated variation value, using position data, if no SeaTalk or
   NMEA value is available.

4. The current manual variation value, if no SeaTalk or NMEA value
   and no position data is available.

Manual Mode

If you select Manual mode, by pressing either of the MANUAL keys, you
can specify the local variation value according to the area in which you
are operating. Press the appropriate MANUAL key to adjust the variation
up or down, to a maximum of 30° East or West.

This value is then transmitted to any other SeaTalk instruments on your
system. It is retained if you turn the display off and on again.

In Manual mode, incoming NMEA variation is ignored. However, if the
variation is changed on another SeaTalk instrument, the new value is
used and the manual value that is displayed is updated.

Note: *The Manual variation value defaults to 0°, so it is important to set
up a value if variation is not available from an external source.*

Cursor Echo

You can set up your system so that radars, plotters and chartplotters
connected viaSeaTalk can display each other's cursors.

Press the CURSOR ECHO soft key to display the cursor transfer soft keys.
The following options can be toggled ON or OFF:

- **Radar Cursor In:** displays the cursor from another radar on the chart display or chart window (default - OFF).
- **Chart Cursor In:** displays the cursor from another plotter or chartplotter (default - OFF).
- **SeaTalk Cursor Out:** enables the output, onto SeaTalk, of the display's own cursor (default - OFF).

Note: *The remote display must have SeaTalk Cursor Out enabled.*

If you set the options to OFF, no cursor echo information is displayed.

Date and Time Settings

Set your preferred date format (DD/MM/YY or MM/DD/YY) and time format (12 or 24 hour). If you wish to display local time, use the soft keys to change from UTC to the required time offset. This can be up to ± 12 hours, in hourly steps.

GPS Source

Select the source of the GPS data. This can be set to either MASTER or REPEATER. The factory default is MASTER.

NMEA Input

Select the NMEA input setting as appropriate. This can be set to either NMEA or RTCM.

Language

Select the language in which you wish information to be displayed. The selected language will be used for screen text, labels, menus and options, but will not affect the letters displayed by the context-sensitive cursor. The language setting also affects the display format for lat/long position information.

Simulator

The simulator allows you to operate your Chartplotter without data from the antenna and/or external data sources. When the simulator is switched on, a SIMULATOR data box is displayed during operation, showing that simulation has been selected.

4.4 Chart Set Up Parameters

The CHART SET UP option allows you to set up the Chartplotter according to your system configuration and your personal preferences.

The following table lists the Chart Set up parameters and their options, shows the factory default setting and provides a space for you to make a note of your new default setting. Each parameter is described in the following subsections.

Table 4-2: Chart Set Up Parameters

Parameter	Options	Factory Default	New Default
CUSTOMISE CHART	See below for details		
PLOTTER MODE	OFF ON	ON	
CHART ORIENTATION	NORTH UP COURSE UP HEAD UP	NORTH UP	
OBJECT INFORMATION	OFF ON	ON	
WAYPOINT SYMBOLS	OFF ON	ON	
WAYPOINT NUMBERS	OFF ON	OFF	
DEFAULT WAYPOINT SYMBOL	Fish, skull, X or anchor symbol	X	
HEADING VECTOR	OFF, 3 MINS, 10 MINS INFINITE	OFF	
COG VECTOR	OFF, 3 MINS, 10 MINS INFINITE	OFF	
TIDE VECTOR	OFF, 10 MINS, 1 HOUR INFINITE	OFF	
DATUM SELECTION	WGS 84, LOCAL	WGS 84	

Customize Chart

This provides a list of chart options, enabling you to specify how the chart features are displayed. Most options can be toggled between on, off and custom. Custom passes on/off control to the SCREEN soft keys (see Customizing the Screen Presentation Options in Chapter 2).

The following features can be set using Customize Chart, factory default settings are shown in bold type:

- Chart Text (OFF, ON, CUSTOM)
- Chart Text Size (SMALL, NORMAL, LARGE)
- Chart Boundaries (OFF, ON, CUSTOM)
- Spot Soundings (OFF, ON, CUSTOM)
- Depth Shading Limit (10m TO 999m)
- Depth Contours (OFF, ON, CUSTOM)
- Depth Contour Display (upper and lower limits) 0m to 100m
- Nav Marks (OFF, ON, CUSTOM)
- Light Sectors (OFF, ON, CUSTOM)
- Caution and Routing Data (OFF, ON, CUSTOM)
- Marine Features (OFF, ON, CUSTOM)
- Land Features (OFF, ON, CUSTOM)
- Icon Display (SIMPLE, DETAILED, CUSTOM)

Note: *Factory default for* CUSTOM *options is* ON.

Plotter Mode

Plotter Mode enables you to zoom into a smaller area, even when no chart data is available for that scale. This allows you use the chartplotter functions at large scales even when a chart card is not installed.

Chart Orientation

The chart is normally North Up, but can be changed to Course Up or Head Up if heading data is available. The orientation modes give the following displays:

- North Up: The screen is displayed with north upwards. As you change heading, the ship's heading marker moves. This is the default mode and is the only mode available if there is no heading data.
- Course Up: The chart is stabilized and displayed with the currently selected course upwards. If you select a new course, the picture rotates to display the new course upwards.

    The reference used for the Course Up depends on the information available. The first available in the following is used:

    - A locked heading over a SeaTalk connection
    - The heading at the time Course Up was selected

    To update the Course Up reference whilst Course Up is the current mode, re-select Course Up from the set up menu.

- Head Up: The display shows the vessel's current heading upwards. As the heading changes the image will rotate.

Object Information

You can set Object Information ON or OFF. When set ON, object information is displayed in normal chartplotter operation when the cursor is placed over a chart object for two seconds. When set OFF, no information is displayed.

Waypoint Symbols

This setting controls whether or not the waypoints are shown on the display, with their appropriate symbols. The active waypoint, and waypoints in the current route, are always shown.

Waypoint Numbers

This setting controls whether or not the waypoint numbers are shown for any waypoints in the current route.

Default Waypoint Symbol

This setting provides a selection of symbols for the default waypoint display.

Vectors

Heading, Tide and Course Over Ground vectors can be displayed as a line from your vessel. The length of the vector is determined by your choice of SOG and the time period. An infinite vector extends to the edge of the screen.

- Heading Vector indicates your current heading.
- COG Vector indicates your course over ground.
- Tide Vector indicates the tide set. Tide information is calculated from the speed through water, compass plus COG and SOG.

Datum Selection

You can select either WGS 84 or LOCAL datum. In LOCAL mode, you are presented with a Datum Names list. Use the trackpad up/down to scroll through the list; press **ENTER** to select the option and close the menu.

Note: *When the datum (reference grid) is changed, the geographical position of waypoints remains constant. However, the latitude/longitude values change as a result of their having been calculated from a different datum. When adding waypoints numerically to the waypoint list, or via SeaTalk, NMEA, it is important that they are referenced to the same datum in which the display is to be operated.*

4.5 GPS Set Up

The GPS set up page provides information for the status of the tracked navigation satellites plus HDOP and satellite Fix Status. It also provides the ability to set up a Coastal GPS by manually retuning it to a different differential beacon.

➤ To select GPS Set Up:

1. Press the GPS SET UP soft key to display the GPS Status screen with associated soft keys as shown in *Figure 4-2*:
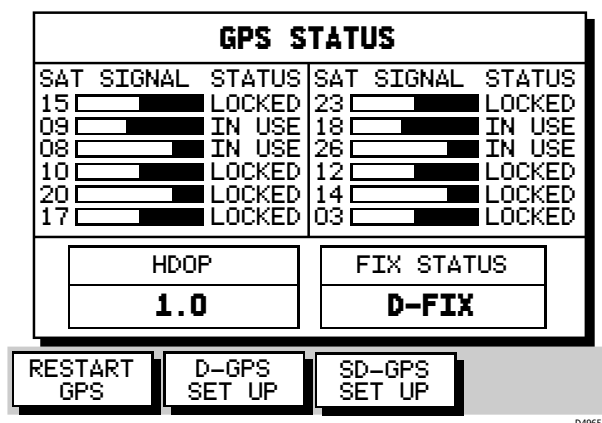
Figure 4-2: GPS Status Screen

The GPS Status screen provides, for each tracked satellite, the satellite number, a graphical signal strength bar and its current usage status. Data for up to 12 satellites is shown.

Positional accuracy is dependent upon certain parameters; in particular for GPS, the azimuth and elevation angles are used in a triangulation process to calculate position. HDOP (Horizontal Dilution Of Position) is a measure of this accuracy; a higher figure signifies greater error. In ideal circumstances, the figure should be in the region of 1.0. The Fix Status can indicate:

- FIX, where a satellite fix has been acquired
- D-FIX, where a differential beacon fix has been acquired
- SD-FIX, where a satellite differential fix has been acquired
- NO FIX, where no fix can be acquired

Fix Mode

Fix Mode provides selection of the method used to acquire a position fix.

➤ To select the required Fix Mode:

1. Press the FIX MODE soft key repeatedly to cycle through the available modes.

    i.   Select GPS to calculate a fix using GPS data only.

    ii. Select D to calculate a fix using Differential GPS data, if available.

    iii. Select SD to calculate a fix using Satellite Differential data, if available.

2. Press **CLEAR** to exit.

D-GPS Set Up

The D-GPS SET UP function provides the ability to set up an external Differential GPS, either automatically (default) or by manually retuning it to a different differential beacon.

➤ To set up a D-GPS:

Press the D-GPS SET UP soft key.

The D-GPS SET UP screen is displayed as shown in *Figure 4-3*.

```
┌────────────────────────────────────────┐
│     DIFFERENTIAL GPS SET UP             │
├────────────────────────────────────────┤
│ MODE                      AUTO          │
│ BEACON ID                 1024          │
│ BEACON FREQUENCY          287.5kHz      │
│ BIT RATE                  100 bps       │
│ SIGNAL STRENGTH           50dB          │
│ SIGNAL/NOISE RATIO (SNR)  30dB          │
│ DIFFERENTIAL AGE          2 s           │
└────────────────────────────────────────┘
  ┌──────────┐  ┌──────────────┐  ┌──────────┐
  │  MODE    │  │SET BEACON FREQ.│ │BIT RATE  │
  │ AUTO MAN │  │   287.5 kHz    │ │ 100 bps  │
  └──────────┘  │   ▼       ▲    │ └──────────┘
               └──────────────┘
                                          D4966_1
```

Figure 4-3: D-GPS Set Up Screen

D-GPS Mode

➤ To change the beacon selection mode:

Press the MODE soft key to toggle between AUTO and MAN modes; the selected mode is highlighted and appears in the Set Up table.

In AUTO mode, the D-GPS is set to automatic and beacon selection is made automatically by the beacon receiver.

In MANual mode, the user selected beacon and bit rate are sent to the beacon receiver.

Note: *If the display unit is receiving RTCM data via NMEA, repeating a differential fix from another unit, the* MODE *soft key is set to* AUTO *and is grayed out. If receiving* RTCM *data, the setting must be performed manually on the external DGPS receiver.*

Beacon ID

This shows the Beacon ID of the beacon transmitter.

If no beacon has been locked onto, this item states NOT LOCKED.

Beacon Frequency

Both the menu item and associated soft keys show the currently used differential beacon's frequency in kHz.

In AUTO mode, this is the frequency received from the beacon receiver and the soft keys are disabled and grayed out.

In MAN mode, this frequency is the user selected value which is sent via SeaTalk/NMEA to the beacon receiver.

➤ To set a new beacon frequency manually:

Press the SET BEACON FREQUENCY soft key arrows to increment or decrement the frequency in 0.5kHz steps.

The frequency range available is 287.5kHz to 325.0kHz.

Bit Rate

Both the menu item and associated soft keys show the currently used differential beacon's bit rate in bps.

In AUTO mode, this is the value received from the beacon receiver and the soft keys are disabled and grayed out.

In MAN mode, this is the user selected bit rate which is sent to the beacon receiver.

➤ To set a new bit rate manually:

Press the BIT RATE soft key repeatedly to toggle between the options 100bps and 200bps.

Signal Strength and Signal to Noise Ratio

These items indicate the received signal strength and Signal to Noise Ratio (SNR) in dB, received from the beacon receiver. If the display unit is using RTCM data received via NMEA, this information is not available and the item shows dashes, one per character.

The received Signal Strength and SNR are interrelated. SNR provides a measure of the quality of the received signal and is dependent upon signal strength.

Differential Age

Differential Age indicates the time elapsed since the last differential beacon correction update.

Chapter 5: Installation

5.1 Introduction

This chapter provides instructions to assist in planning the installation of the Raychart 320 Chartplotter aboard your vessel.

Note: *If you wish to practice using the Raychart 320 Chartplotter before installation, you can connect it, via a 1A quick blow fuse, to a 12VDC power supply and operate it using the simulator mode, as described in Chapter 2: Getting Started.*

EMC Installation Guidelines

All Raymarine equipment and accessories are designed to the best industry standards for use in the recreational marine environment.

Their design and manufacture conforms to the appropriate Electromagnetic Compatibility (EMC) standards, but correct installation is required to ensure that performance is not compromised. Although every effort has been taken to ensure that they will perform under all conditions, it is important to understand what factors could affect the operation of the product.

The guidelines given here describe the conditions for optimum EMC performance, but it is recognized that it may not be possible to meet all of these conditions in all situations. To ensure the best possible conditions for EMC performance within the constraints imposed by any location, always ensure the maximum separation possible between different items of electrical equipment.

For **optimum** EMC performance, it is recommended that **wherever possible**:

- Raymarine equipment and cables connected to it are:
  - At least 3 ft (1 m) from any equipment transmitting or cables carrying radio signals e.g. VHF radios, cables and antennas. In the case of SSB radios, the distance should be increased to 7 ft (2 m).
  - More than 7 ft (2 m) from the path of a radar beam. A radar beam can normally be assumed to spread 20 degrees above and below the radiating element.
- The equipment is supplied from a separate battery from that used for engine start. Voltage drops below 10 V, and starter motor transients, can cause the equipment to reset. This will not damage the equipment, but may cause the loss of some information and may change the operating mode.

- Raymarine specified cables are used. Cutting and rejoining these cables can compromise EMC performance and must be avoided unless doing so is detailed in the installation manual.
- If a suppression ferrite is attached to a cable, this ferrite should not be removed. If the ferrite needs to be removed during installation it must be reassembled in the same position.

Suppression Ferrites

The following illustration shows typical cable suppression ferrites used with Raymarine equipment. Always use the ferrites supplied by Raymarine.
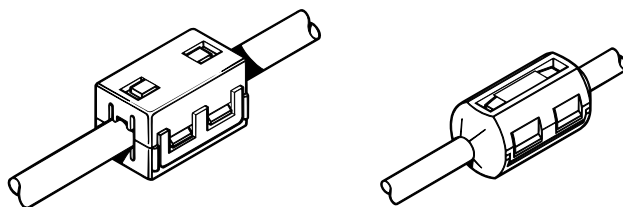
Figure 5-1: Typical Suppression Ferrites

Connections to Other Equipment

If your Raymarine equipment is to be connected to other equipment using a cable not supplied by Raymarine, a suppression ferrite MUST always be attached to the cable near to the Raymarine unit.

5.2 Unpacking and Inspecting the Components

Unpack your Raychart 320 Chartplotter carefully. Retain the carton and packing materials in the event that you need to return the unit for service:

System Parts and Accessories

Item	Part No.	Supplied with
RC320 System	E32015	
Sun Cover	E35008	All
Active Antenna	E35009	All
Trunnion Mount Kit	E35011	All
Power Cable	R38024	All
TNC Coaxial Extension Cable 10m	E36011	Optional

Item	Part No.	Supplied with
Panel Mount Kit	R38061	Optional
Handbook	81167	All
Quick Reference Card	86052	All

Items Missing?

If any one (or more) of the above items is missing or damaged, please contact your Raymarine dealer or our Product Support Department to obtain replacement parts. **Please note that missing or damaged items cannot be replaced without proof of purchase.**

Registering this Product

When you have checked that you have all of the listed components, please take the time to complete the pre-paid warranty registration card. This ensures that the appropriate warranty conditions will apply.

5.3 GPS Antenna Installation

The GPS Antenna is designed to receive the signals emitted from the satellites in a direct path. Ideally, the unit should be mounted horizontally in a location that is open and clear of any masts or other structures that could block line-of-sight reception of signals. The height of the GPS Antenna is not as important as it's having a clear view horizon to horizon for optimum signal reception. In fact, the lower the unit can be mounted and have a clear view to satellites, the better. The more stable the unit, the easier it is to track satellites lower to the horizon.

The GPS Antenna can be mounted on a pole. Alternatively, you can use a pole mounting bracket or surface mount kit.

When mounting the GPS Antenna flush to a deck surface avoid areas where the unit will be trodden upon or where it may present a tripping hazard.

The GPS Antenna should be separated by at least 3ft (1m) from other communication antennas and should not be mounted in the direct path of a Radar's antenna beam.

When planning the location for the unit, consider finding a convenient pathway for running the interconnecting cable between the GPS Antenna and the Chartplotter or to the rest of an integrated system. Ideally the cable should be run in a manner such that it is hidden from view and, if possible, be in a direct path to the point of connection. It is important to

keep the cable separated from other cables as far as possible to prevent interference pick-up.

Note: *DO NOT cut the cable; an extension cable is available from your Raymarine dealer. Mounting on the mast of a sailboat is not recommended.*

Surface Mounting

➤ To surface mount the antenna, referring to *Figure 5-2*:

1. Select a suitable area which allows access to the underside of the mounting surface for fixing and, using the template supplied in this handbook, carefully drill the two 6mm (0.25in) fixing holes marked.

2. If the cable is to pass through the mounting surface drill the 6mm (0.25in) or 19mm (0.75in) centre hole depending on whether the plug is to pass through the surface or not.
If the cable is to exit from the side of the GPS Antenna above the mounting surface, remove the two plastic tabs (1) obstructing the cable channel.

Note: *Failure to remove the plastic tabs from within the cable channel could result in cable damage.*

3. Screw the supplied brass studs (2) into the underside of the GPS Antenna.

4. Affix the supplied gasket (3) to the mounting surface ensuring that the holes match and pass the cable through the centre hole or the cable exit channel.

5. Carefully position the GPS Antenna, passing the studs through the holes in the mounting surface and secure to the mounting surface using the thumb nuts provided (4).

Top view   Underside view   D4725_1
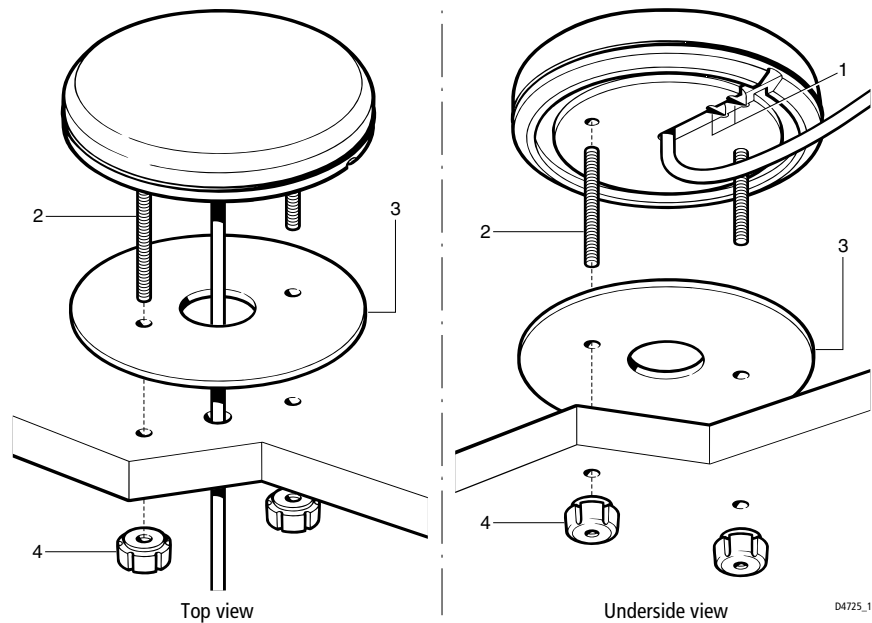
Figure 5-2: Surface Mounting Arrangement

Pole Mounting

➤ Refer to *Figure 5-3*:

1. Screw the pole mount base to a suitable pole or rail mount bracket, having an industry standard 1inch 14TPI thread, until secure.
2. Pass the cable through the centre hole of the pole mount base (A) or insert the cable into the side exit channel (B).
3. Check that the cable is positioned correctly and secure the GPS Antenna to the pole mount base using the two screws provided.
    If the cable is to exit from the side of the GPS Antenna through the side channel, remove the two plastic tabs obstructing the cable channel.

Note: *Failure to remove the plastic tabs from within the cable channel could result in cable damage.*
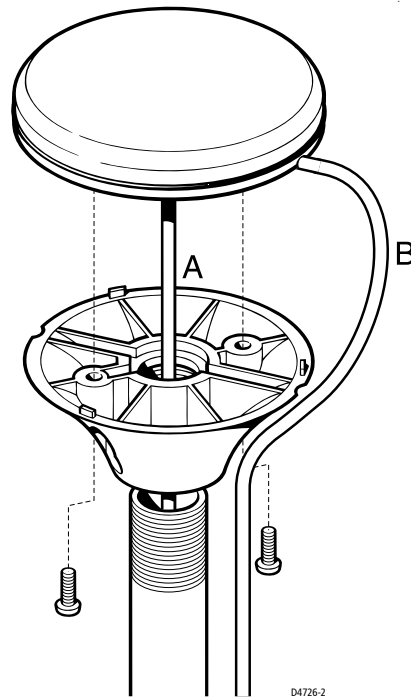
Figure 5-3: Pole Mounting Arrangement

5.4 Chartplotter

The display unit can be mounted using the trunnion (yoke) bracket, or panel mounted using the optional Panel Mounting Kit.

When planning the installation of your Raychart 320, the following points should be considered:

- **Convenience:** The unit should be installed in a convenient position where it can be viewed straight on or with a viewing angle of less than 35°. You may wish to apply power, before you install the unit, to determine the best viewing angle prior to fixing. The mounting location should be easily accessible to allow operation of the front panel controls.

- **Access:** There must be sufficient space behind the display unit to allow cable connections to the rear panel connectors, avoiding tight bends in the cable.

- **Interference:** The selected location should be far enough away from devices that may cause interference, such as motors and generators (see the EMC guidelines earlier in this chapter).

- **Cable runs:** The unit must be located near a DC power source. The power cable supplied is 1.5m, but a longer cable can be used if required. Power must be supplied via a 1A quick blow fuse or circuit breaker. Refer to *Section 5.6, Cable Running*.

- **Environment:** The unit should be protected from physical damage, heat sources and excessive vibration. Although the unit is waterproof, it is good practice to mount it in a protected area away from prolonged and direct exposure to rain and/or salt spray. Refit the Sun Cover when not in use to avoid damage to the LCD screen.

The dimensions of the unit, including the bracket, are shown in *Figure 5-4*.
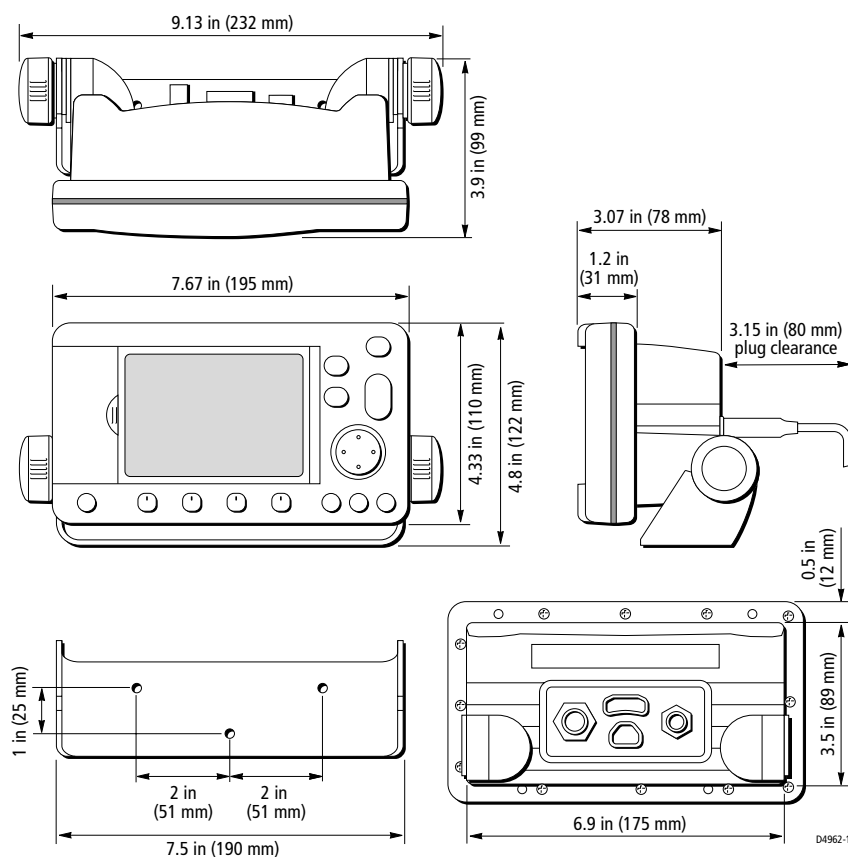
Figure 5-4: Raychart 320 Chartplotter Dimensions

Trunnion (yoke) Mounting

The display unit can be conveniently mounted on a dash area, chart table, bulkhead or deckhead.

➤ To trunnion mount the display unit, proceed as follows:

1. Loosen the trunnion knobs and remove the trunnion from the display unit.
2. Mark the locations of the trunnion screw holes on the mounting surface.
3. Use the screws supplied to fix the trunnion at the marked locations.
4. Fit the unit to the trunnion, adjust the display angle and tighten the knobs.
5. Connect the Power/NMEA and GPS cables to the unit, avoiding tight bends in the cables.

Panel Mounting

CAUTION:
Make sure that there are no hidden electrical wires or other items behind the location before proceeding. Make sure that there is sufficient rear access for mounting and cabling.

The unit can be panel mounted, using the panel-mounting kit (accessory) available from your local Raymarine dealer.

➤ Referring to *Figure 5-5*, panel mount the unit as follows:

1. Check the selected location for the unit. A clear, flat area at least 7.67in (195mm) wide by 4.33in (110mm) high, with at least 5in (125mm) of clearance behind the panel, is required.
2. Unpack the (optional) panel-mounting kit.
3. Using the supplied template, trace out the display unit cut-out and mark the drilling centers for the four securing holes outside of the cut-out area.
4. To provide start holes for removing the cut-out, drill four $3/_8$in (10mm) holes in each opposing corner of the cut-out area.
5. Drill out the four $3/_{16}$in (5mm) securing holes as indicated on the template. It is recommended that a $1/_{16}$in (1mm) pilot hole is drilled first.
6. Using a suitable saw, cut along the inside edge of the cut-out line.
7. Remove the trunnion (yoke) knobs and carefully pry off the (black) ratchet inserts from the unit case.
8. Offer up the unit to the cut-out ensuring that it fits in the cut-out area.

9. Offer up the gasket to the unit ensuring that it lines up with the brass inserts in the case.

10. Remove the protective paper from the adhesive side of the gasket (this is the side that is to be affixed to the unit).

11. Press the gasket onto the unit and slide the unit into the panel cut-out.

12. Screw the studs into the vacant holes at the rear of the unit, hand tight only.

13. Slide a spacer ferrule onto each stud.

14. Secure the unit with the thumb nuts, hand tight only.
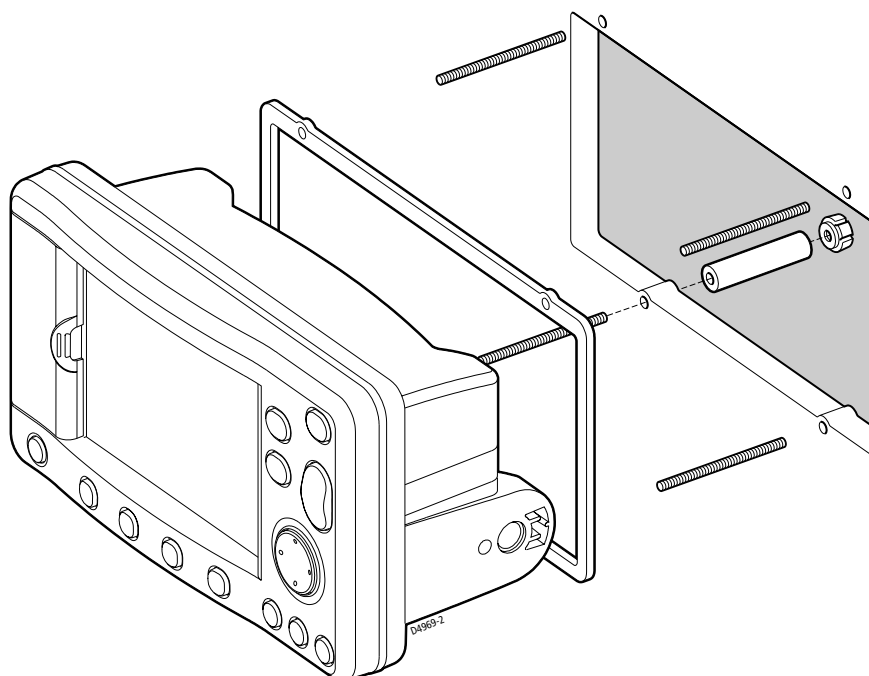
Figure 5-5: Panel Mounting

5.5 Connecting to Other Equipment

The unit transmits navigation and waypoint data on NMEA[1] and SeaTalk and, therefore, can be connected to an NMEA compatible autopilot or instrument repeater(s). The navigation data transmitted and received by the Chartplotter is detailed in *Appendix B* to this handbook.

---

1. *National Marine Electronics Association (NMEA) 0183 interconnection standard, Version 2.3 April 1998.*

5.6 Cable Running

Introduction

Consider the following points before installing the system cables:

The minimum requirements are a power cable and a connection from the associated GPS Antenna. Additional cables will be required if you are connecting to other equipment.

Notes: (1)*All cables should be adequately cleated and protected from physical damage and exposure to heat. Avoid running cables through bilges or doorways, or close to moving or hot objects.*

(2)Where a cable passes through an exposed bulkhead or deck-head, a watertight gland or swan neck tube should be provided.

Connectors

Run the following cables from the following connectors provided at the rear of the chartplotter:

- **ANTENNA**, for connection to the associated GPS antenna.
- **PWR/NMEA**, for DC power and NMEA inputs/outputs.
- **SeaTalk**, using the dedicated SeaTalk connector.

Antenna Connector

The ANTENNA connector provides power and RF connection to the associated GPS Antenna.

CAUTION:
Do not connect/disconnect the GPS Antenna from the display unit whilst power is applied. Such action could cause irreparable damage.

➤ Connect the antenna using the attached cable, as follows:

1. If not already installed, mount the GPS Antenna as described in *Section 5.3*.
2. Feed the cable through to the rear of the Chartplotter.
3. Coil up any unused cable in an appropriate safe space out of view. Do not bend the cable tighter than 4in (100mm) radius.
4. Screw the cable connector fully into its mating connector on the Chartplotter.
5. Ensure that the protective boot covers the connector.

Note: *If the supplied cable is too short, use an extension cable (Part# E36011) available from your Raymarine dealer.*

PWR/NMEA Connector

CAUTION:
If you do not have a breaker in your power circuit, you must fit an in-line 1A quick-blow fuse to the positive (red) lead of the power cable.
This unit is not intended for use on positive ground vessels.

The Chartplotter is intended for use on vessels' DC power systems operating in the range 12VDC to 24VDC (9.0VDC to 32.0VDC maximum range). A 5ft (1.5m) power cable is supplied.

The power connections should be made at a DC power distribution panel through an isolator switch, a 1A circuit breaker or a 1A quick blow fuse. Check that all connections are clean and tight.

The DC power system should be either:

• Negative ground, with the negative battery terminal connected to the vessel's ground.

• Floating, with neither battery terminal connected to the vessel's ground.

If a longer power cable run is required, use the supplied power cable to connect to the unit, then use a suitable connector block to connect the free end to the extension cable. The supplied power cable has a cross-section of 2.0mm^2 (15 AWG).

Longer power cable runs may require larger wire gauges to minimize any voltage drop in the cable. In order to determine the correct supply cable size if the power cable must be extended, estimate the length of cable between the vessel's main power source and the connector block, then select the wire size determined by the distance as indicated in *Table 5-1*.

Table 5-1:Maximum Power Cable Extension Lengths

Power Cable Core mm^2:	1.5	2.0	2.5	4.0	6.0	10.0
Equivalent AWG:	16	15	14	12	10	8
Maximum Extension (feet):	36	49	65	98	147	230
Maximum Extension (meters):	11.0	15.0	20.0	30.0	45.0	70.0

The DC power and NMEA inputs/outputs should be connected to the **POWER/NMEA** connector at the rear of the Chartplotter. The connector pin functions are detailed in *Table 5-2*.

Table 5-2: Power/NMEA Connections

Function	Color
Battery negative	Black
Battery positive	Red
NMEA data input (+ve)	White
NMEA input (-ve) -common	Green
Not connected	Gray
NMEA data out	Yellow
NMEA Data output common	Brown
Not connected	Screen

➤ Connect the power supply using the standard power cable supplied:

1. Connect the moulded power plug to the **PWR/NMEA** connector on the rear of the Chartplotter. Run the free end back to the vessel's distribution panel or, if insufficient cable length, to a junction box.

2. Cut the cable to length and connect the red wire, via a fuse, to the +ve battery terminal and the black wire to 0V (-ve battery terminal). Protect the circuit with a 1A quick blow fuse or circuit breaker.

3. Use a suitable junction box to connect to NMEA equipment if required.

4. Cut any unused cores short or insulate and tape back.

Note: *If the power connections are accidentally reversed, the system will not function. Use a voltmeter to check that the input power leads are the correct polarity.*

SeaTalk Connector

The Chartplotter can be connected to an existing SeaTalk system by connecting a SeaTalk cable (available from your Raymarine dealer) into the **SeaTalk** connector on the rear of the Chartplotter. The data is passed from instrument to instrument via the daisy chained cable.

Note: *The SeaTalk connector cannot be used to power the Chartplotter. Power is not supplied to other SeaTalk equipment.*

5.7 System Check and Initial Switch On

When you have installed your Chartplotter and made all the connections, you need to check your installation before using the system for navigation. If you encounter any problems, refer to *Chapter 6: Maintenance & Fault Finding*.

EMC Conformance

Always check the installation before going to sea to make sure that it is not affected by radio transmissions, engine starting etc.

System Check

Before performing the functional test, check that:

- All connections have been made.
- All connecting wires are secured and protected.

Initial Switch On

To switch on the chartplotter:

1. Press and hold the **POWER** key until the unit beeps.
2. If necessary, adjust the lighting and contrast (see *Chapter 2*).
3. If required, change the default language settings as follows:

    i. Press the **MENU** key to display the setup function bar.

    ii. Press the SYSTEM SET UP soft key and press **ENTER**.

    The SYSTEM SET UP menu is displayed, listing the parameters and their current settings. The complete list, which can be scrolled through, is shown in part in *Figure 5-6*:
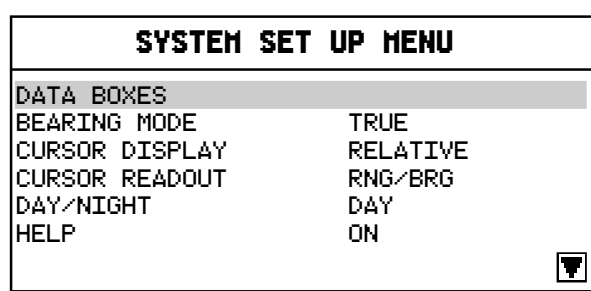
Figure 5-6: System Set Up Screen

4. Using trackpad up/down, select the LANGUAGE option.
5. Using left/right soft key arrows, select the required language.
6. Press **ENTER** to return to the setup functions, then **CLEAR** to return to the normal Chartplotter screen.

Checking the Chartplotter Operation

To confirm that your Chartplotter is operating correctly, perform the following checks:

1. Without a C-MAP C-Card fitted, verify that the world map is visible.
2. Press the trackpad left/right, up/down and check cursor movement and normal scrolling action.
3. Insert a C-MAP C-Card for the area in which your vessel is sailing. Use the **RANGE** key to zoom-in to check that the new chart cartridge is being displayed.
4. Ensure that position data is available; use the FIND SHIP function to check that the cursor is fixed on the vessel symbol which is correctly positioned at the centre of the Chartplotter display, see *Chapter 4: Setting Up the Chartplotter*.

Chapter 6: Maintenance & Fault Finding

This chapter provides information on routine maintenance and on possible causes of problems you may experience with your Raychart 320 Chartplotter.

6.1 Maintenance

WARNING:

The chartplotter contains specialized circuits only accessible to qualified service technicians - there are no user serviceable parts or adjustments and the operator should not attempt to service the equipment. The operator should not remove the rear cover.

Routine Checks

The chartplotter is a sealed unit. Maintenance procedures are therefore limited to the following periodical checks:

- Wipe the display unit clean with a damp cloth.
- Examine the cables for signs of damage, such as chafing, cuts or nicks.
- Check that the cable connectors are firmly attached and that the connections to the vessel's DC power are clean and tight.
- Ensure that the cartridge cover is always fitted correctly.

Note: *Never use chemical or abrasive materials to clean the chartplotter. If the unit is dirty, wipe it with a clean, damp cloth.*

EMC Servicing and Safety Guidelines

- Raymarine equipment should be serviced only by authorized Raymarine service technicians. They will ensure that service procedures and replacement parts used will not affect performance. There are no user serviceable parts in this Raymarine product.
- Some products generate high voltages, so never handle the cables/connectors when power is being supplied to the equipment.
- When powered up, all electrical equipment produces electromagnetic fields. These can cause adjacent pieces of electrical equipment to interact with one another, with a consequent adverse effect on operation. In order to minimize these effects and enable you to get the best possible performance from your Raymarine equipment, guidelines are given in the installation instructions, to enable you to ensure minimum interaction between different items of equipment, i.e. ensure optimum Electromagnetic Compatibility (EMC).

- Always report any EMC-related problem to your nearest Raymarine dealer. We use such information to improve our quality standards.
- In some installations, it may not be possible to prevent the equipment from being affected by external influences. In general this will not damage the equipment but it can lead to spurious resetting action, or momentarily may result in faulty operation.

6.2 Resetting the System

Two types of reset are available:

- **Power-On Reset:** When you turn the display unit off, then on again, the screen reverts to the default Chartplotter display.
- **Factory Reset:** This resets all values back to their original factory settings.

Note: *Take care; Factory Reset clears all Waypoint and Route databases.*

At power-on, the last-used values are retained for all the options, except for those listed in *Table 6-1* which are reset to the factory default each time.

Table 6-1: Power-on Settings

Item	Power-on Setting
Heading Mode	North Up
Alarm	ON, with last used value
Contrast Level	Last used value or within 30% to 70% range, if last used value outside this range
Backlight Level	ON at the lowest level if previously ON

➤ To perform a Factory Reset:

1. Press the **MENU** key to access the SET UP soft keys.
2. Press the SYSTEM SET UP soft key.
3. Press and hold the **MENU** key until <RESET IN Xs> countdown timer is displayed.
4. Either hold the **MENU** key until the countdown timer times out or release the **MENU** key to abort Factory Reset.

   When the unit is reset, it restarts as for a first time Power Up with all values reset to their original factory settings

Note: *The factory default settings are listed in Chapter 4.*

6.3 Problem Solving

Prior to packing and shipping, all Raymarine products are subjected to comprehensive test and quality assurance programs. However, should this unit develop a fault, refer to *Table 6-2* to identify the most likely cause and the corrective action required to restore normal operation.

If you still have a problem, contact your local dealer, national distributor or Raymarine Product Support for further advice.

Always quote the product serial number.

Table 6-2: Fault Finding Guide

Problem		Corrective Action
Unit does not function	1	Make sure that the power supply cable is sound and that all connections are tight and free from corrosion.
	2	Check polarity of the DC power cables for proper connection. Reconnect leads as necessary.
	3	Check in-line fuse and replace as required.
	4	Check vessel's power (battery) for correct voltage readings (9.0VDC to 32.0VDC).
Poor display definition		Adjust contrast setting and/or backlight level.
No fix		Check GPS Antenna connector. Check that GPS Antenna not obstructed.
No NMEA data received		Check POWER/NMEA connector and NMEA equipment.
Loss of stored data eg. waypoints		Return to dealer for internal battery check.
No detailed chart data		Check that C-Card is securely fitted. Check that C-Card contains appropriate cartography.
Other problems		Visit our website: *www.raymarine.com*

Appendix A:Technical Summary

Feature	Description	
CE	Conforms to 89/336/EEC(EMC), EN60945:1997	
Y2K	Compliant	
Size	7.7in (195mm) x 4.33in (110mm) x 3.9in (99mm), excluding trunnion	
Weight	1.65 lb. (0.75 kg)	
Environmental	Waterproofing	To CFR46; suitable for external mounting
	Temp Range, Operating:	-10°C to +70°C
	Temp Range, Storage:	-40°C to +85°C
	Humidity	20% to 95% RH
Mounting	Trunnion (yoke) or panel	
Power	Input voltage	9.0VDC to 32.0VDC with reverse polarity protection
	Consumption	<3W @12VDC (typical)
Controls	8 defined keys, 4 soft keys and trackpad	
Display type	Film Super Twist Neumatic (FSTN) monochrome LCD 240 x 160 pixels landscape	4 gray scales, 8 levels of backlighting, 16 levels of contrast
Display size	4½in (114.3mm) diagonal	
Interfaces	PWR/NMEA	NMEA 0183 receive and transmit or RTCM input/NMEA 0183 transmit (detailed in Chapter B) Waypoint upload/download (WPL and RTE)
	SeaTalk	Detailed in Chapter B
	ANTENNA	GPS active antenna
Position data	GPS*	WAAS / EGNOS / MSAS ready
GPS receiver	12-channel, Internal	1575.42 Mhz ‡1 MHz (C/A code), L1
Time to first fix	<8 seconds typical	<45 seconds from cold start (average)

Feature	Description	
Position accuracy	Standard	<15 meters 2D RMS (L1,C/A code, HDOP <2 without SA)
	With WAAS / EGNOS / MSAS	<7.5 meters 2D RMS (L1,C/A code, HDOP <2 without SA)
Cartography	C-MAP NT®Chart cartridge (x2)	
Software update	From a PC serial port via the NMEA or Cartography cartridgeinterface	
Memory	Capacity:	Waypoints: 1000 max (20 routes of up to 50 waypoints)
		Track history: 4500 points stored in 5 files of up to 750 points each
	Protection:	Built in Lithium battery giving ~5 years usage

Appendix B:SeaTalk and NMEA Data

The following table defines the data received on the NMEA/SeaTalk ports. Data sources are listed in order of priority unless otherwise indicated.

Data Received	Source
Position (LAT/LON)	SeaTalk, GGA, RMC, RMA, GLL
Speed and Course Over Ground	SeaTalk, RMC, RMA, VTG
Waypoint Identifier	SeaTalk, RMB, APB, BWC, BWR
Bearing to Waypoint	SeaTalk, RMB, BWC, BWR
Distance to Waypoint	SeaTalk, RMB, BWC, BWR
Cross Track Error (XTE)	SeaTalk, RMB, APB, XTE
Depth	SeaTalk, DBT, DPT
Apparent Wind Angle and Speed	SeaTalk, MWV (relative)
Boat Speed Through Water	SeaTalk, VHW
Total Log and Trip Log	SeaTalk, VLW
Water Temperature	SeaTalk, MTW
Heading	HDG, HDM, HDT, VHW, SeaTalk
Locked Heading	SeaTalk only (Autopilot / Steering Compass)
Magnetic Variation	SeaTalk, RMC, RMA, HDG
Rudder Angle	SeaTalk only
Time (No priority)	SeaTalk, ZDA, GGA, RMC, GLL, BWC, BWR
Date	SeaTalk, ZDA, RMC
MOB data	SeaTalk only
Autopilot Status (Standby / Auto / Vane / Track)	SeaTalk only
Cursor Range and Bearing (from Chartplotter)	SeaTalk only
Cursor Range and Bearing (from Radar)	SeaTalk, RSD
Global Alarms - SeaTalk Only	Watch alarm, Wind alarm, Autopilot alarms, Radar alarms, Depth alarms, Waypoint arrival

Appendix C:List of Abbreviations

Abbreviation	Meaning
BDI	Bearing Deviation Indicator
BTW	Bearing To Waypoint
CDI	Course Deviation Indicator
COG	Course Over Ground. The actual direction of your vessel's movement over the ground
dGPS	Differential Global Positioning System
DR	Dead Reckoning
DTG	Distance To Go
EGNOS	European Geostationary Navigational Overlay System
EMC	Electro-Magnetic Compatibility
ETA	Estimated Time of Arrival
FAA	Federal Aviation Administration
GPS	Global Positioning System
HDOP	Horizontal Dilution Of Precision. The multiplicative factor that modifies ranging error. It is caused solely by the geometry between your vessel and your set of satellites
MOB	Man OverBoard
NMEA	National Marine Electronics Association (interconnection standard)
MSAS	Multi SAtellite System
SA	Selective Availability
SDGPS	Satellite Differential Global Positioning System
SOG	Speed Over Ground. The rate of movement of the vessel over the ground
TTG	Time To Go
WAAS	Wide Area Augmentation System
WPT	Waypoint
XTE	Cross Track Error

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Index

36mm (1.4in)

18mm
(0.7in)

19mm (0.75") dia.
for NMEA plug

36mm (1.4in)

18mm
(0.7in)

6mm (0.25") dia.
for cable only

Cable Exit Channel

6mm (0.25") dia.
2 positions

D4194-1

GPS Antenna Mounting Template

Note: *Access to the underside of the mounting surface must be available
to allow for secure fixing.*

Installation Templates

Raychart 320 Chartplotter Mounting Template

4.33 in (109.9 mm)

3.8 in (96.3 mm)

TOP

5.5 in (139.6 mm)

Drill 4 mm hole (four positions)

Cut out shaded area only

Note: Drill 4 mm fixing holes (four postions) before cutting out shaded area.

4.03 in (102.3 mm)

7.67 in (194.94 mm)

300/320 Template

Outer profile of instrument

D4968-1